

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

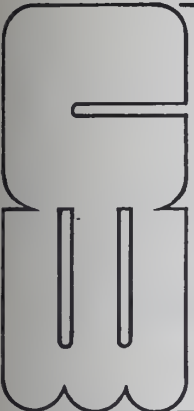
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NEWS IN BRIEF

Caravan Ends '72 Tour; Independents 'Heard'

DETROIT — The first Computer Users' Forum and Exposition sponsored by *Computerworld* has completed its tour of nine major U.S. areas.

Morning panel discussions and workshops were held in each city, with local users as members and workshop leaders. Attendance at the forum sessions totaled over 4,000, with a record 750 in Chicago.

Overall exhibit attendance, excluding exhibitor personnel, topped 18,000, according to H.G. Asmus, general manager.

Speaker Lawrence Feidelman, summarizing the nine data entry meetings, noted, "It's about time we sat down and talked about our problems."

Computer users gained valuable experience and knowledge by sharing first-hand experiences and information, and by discussing problems and equipment with their DP colleagues, according to Feidelman, president of Management Information Corp., Cherry Hill, N.J.

If one thing was learned over the nine weeks of meetings, noted data communications speaker Dixon Doll, it was that users "have finally realized that there is a case for the independent suppliers."

In closing out the final day, speaker Charles P. Lecht said the "form, format and content" of the *Computerworld* event was "dead center on target."

The single, most important qualifying aspect was that the forum sessions and panel discussions were "uninfiltrated by manufacturer paid-for scientific whiz kids," he said.

The conferences "continually brought together hard-working users, both as speakers and listeners," who discussed "topics of mutual interest" relating to the use of computer technology.

Lecht, president of Advanced Computer Techniques Corp., said first-hand discussion among users, rather than technical tutorials from vendors, was the correct approach, and that this was made clear to him "after CW's first stop" in Boston.

On the Inside This Week

Underdeveloped Countries Oversold
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DPers Find Free Consulting
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Stresses Communications — Page 17

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Worldly Problem

Dr. Charles McClelland marks a *New York Times* article for inclusion in his computer model of international relations at the University of Southern California. The USC political scientist believes computer analysis can help pinpoint future world trouble spots before problems become insurmountable. (Story on Page 3)

Issued by Project Search

Rap Sheet Guides Stricter

By Edward J. Bride
Of the CW Staff

ALBANY, N.Y. — Guidelines for security and privacy protection, and for the enhancement of the efficiency of computerized criminal offender records have been released by a special committee of Project Search.

While not binding, the document suggests that states involved in the FBI's computerized criminal history project implement the recommended precautions "as soon as possible."

Among the specific measures are the elimination of intelligence data and "informal or subjective comments regarding an individual's behavior or attitudes" from criminal history files, or "rap sheets."

In fact, the rap sheet would not be permitted to contain a notation that an intelligence file exists, if that is the case.

'Purge' Files

Files would be purged or destroyed 10 years after imprisonment for a felony ends, five years after imprisonment on a less serious crime ends, or within a year after favorable disposition of an arrest.

The guidelines were developed and approved by the Committee on Security and Privacy, part of Project Search (System for Electronic Analysis and Retrieval of Criminal Histories).

Agencies Set Controls

The recommendations leave to "each criminal justice agency" the responsibility "to formulate methods and procedures to assure the continuing security" of the data bank under its control.

The measures, however, are subject to the review and approval of the FBI's Security and Privacy Committee, when necessary for "full and prompt compliance" with the proposed regulations.

Regarding intelligence files, the recommendations permit intelligence inquiries to access and print out rap sheets, but the response to a rap sheet inquiry "shall not include information which indicates that an intelligence file exists."

Under the recommended guidelines, individuals will have the right to review their records "within the facilities of a criminal justice agency" and "only under the supervision and in the presence of a designated employee or agent of a criminal justice agency."

(Continued on Page 2)

IBM Printer Tied to 1108

By Don Leavitt
Of the CW Staff

MINNEAPOLIS — An IBM 1403 printer and all its capabilities, including interchangeable print chains, can now be used on a Univac 1108 through hardware and software developed by United Software Co.

Previously, the 1108 was limited to Model 758 or 768 drum printers. The latter provide a choice of type fonts but the drums to produce the different fonts must be installed by Univac engineers.

Though a recent test was limited to printer-mainframe connection, the techniques used suggest that various other devices from "foreign" vendors also can be successfully tied to an 1108, or to an 1106.

Interface Cable

A United-built interface cable linked the 1108, through the Multiple Subsystem Adapter (MSA), to an IBM 2821 Control Unit, which was tied, in turn, to a single 1403.

Univac's MSA is designed to support several peripherals, and depending on the

model used, IBM's 2821 can support card reader punches as well as one or more printers.

Software developed by United takes print files, which are automatically spooled to mass storage or tape, converts the data to the proper format for the 1403 and then drives the printer subsystem. The similarity in size of the Univac-generated character code and the code normally used by the 1403 makes creation of the translation matrices "duck soup," a United spokesman said.

Changes also had to be made to the 1108 Executive system to allow reference to the 1403, through the Arbitrary Device Handler, which was not originally designed to drive or respond to a 360-style subsystem.

Although normal maintenance work on the 1403 requires an IBM CPU, IBM told United that various tests can be run offline and a printer used with a Univac mainframe would be supported in that way, the United spokesman added.

The firm is at 1550 East 78th St., 55423.

Gov't Ignorance On Regulation Hit

By E. Drake Lundell Jr.
Of the CW Staff

MONTVALE, N.J. — Since increased government regulation of computer use appears "inescapable," there is a need for a broad, interdisciplinary study of the industry and the possible effects of further government regulation.

This is the major conclusion of a soon-to-be released study on *Government Regulation of the Computer Industry* written by two officers of the American Federation of Information Processing Societies (Afips).

'Regulation Inescapable'

The effects of computer use "on the total economy, the conduct of business (both government and private) and the lives of every citizen are such that regulation is inescapable," according to Keith Uncapher, Afips president, in the book's foreword. "Yet research and months of interviews with government and industry representatives reveal little understanding and almost no public consideration of either the growing impact of government regulation or the computer industry's economic structure," according to the authors.

A commission to study the impact of regulation "would do much to stimulate the thinking and discussion which we believe to be so essential. It would also help prevent a public attitude favoring regulation from being translated into uninformed or ill-considered government action," they add.

The study, by Bruce Gilchrist, Afips executive director, and Milton R. Wessel, Afips counsel, found "not only that extensive regulation does exist, but that it is characterized by what turned out to be a fundamental and crucial problem — ignorance."

"We were told over and over by government officials explaining actions and inactions, 'we just don't understand what's happening,' or 'the industry is extremely complicated — we'll have to study it.'"

"Even IBM representatives indicated that they knew much less about the industry than was generally assumed."

Throughout the government, the authors charge, there was a "complete lack of knowledge of what the Department of Justice was doing or what its key objectives were. . . ."

(Continued on Page 2)

Study Finds Government Ignorant On Regulation of DP Industry

(Continued from Page 1)

"This, coupled with the importance of antitrust to the computer industry, indicates to us that the Antitrust Division of the Department of Justice must bear considerable responsibility for the lack of government leadership and understanding which is apparent."

Government Ignorance

Research for the project showed, the authors say, "that the Federal Government does not understand that a special form of industry regulation is developing and that the economic structure of the computer industry is in large part being shaped by the many independent government forces affecting it..."

"Even in some areas where we had initially thought some understanding and awareness had motivated government action, we discovered that this was not the fact."

Because of the nature of the computer use, the computer industry falls directly or indirectly within the jurisdictions of many more regulatory agencies than do most other industries, the authors claim.

However, their study shows that present regulation was marked by "areas of inconsistency and ignorance," which "may even have been contributing factors to the demise of General Electric and RCA as mainframe producers... and the current depression in the software, services and peripherals segments which has seen the death of many other smaller companies."

"In addition to the adverse consequences that poor or inappropriate regulation may have on the computer industry, its impact on the general public good must also be considered. This effect is difficult to measure but should be observed in higher than necessary prices to users and fewer than possible technical improvements in equipment and services."

A commission is needed to study the industry and the possibility of regulation because "public pressure for regulation is substantial and on the increase. Such pressure can result in legislative or administrative action," the authors believe.

The most appropriate group to sponsor such a commission would be the professional societies presently in the field, because it appears unlikely that Congress will take the necessary action and because the manufacturer groups are dominated by IBM, they add.

The "Commission on the Computer Industry" would make a series of in-depth studies of the industry concluding with a

Rap Guides Stricter

(Continued from Page 1)

The files and records would not be removed from the premises, thereby necessitating that the individual visit the agency during "ordinary daylight business hours."

If errors are found in the records, the agency is required to make the necessary alterations, and then notify the Security and Privacy Committee, the individual involved and any other agencies "to which the criminal offender record information has previously been disseminated."

Research programs are permitted under the proposal, but only when the agency has ascertained that the security and privacy provisions have been met, and that any threats to individual privacy "are clearly outweighed by the advantages for the criminal justice system" that may "reasonably be expected to result" if the program is permitted.

The decision to allow such programs also resides with the criminal justice agency with custody or control over the data bank.

summary report after "no more than two years," the authors state.

"Such tight timing is critical if the results of the commission's efforts are to be considered in connection with the framing of any proposed IBM consent decrees."

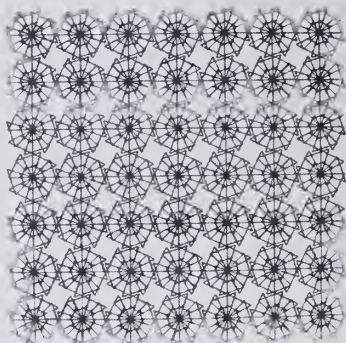
The study would include, but not be limited to, such topics as:

- The need for standards and their consequences
- The nature and effects of the IBM price umbrella
- The consequences of the sale of computer services by large users
- Geographic and product market segments of the computer industry
- The benefits of size in each segment of the computer industry
- Competitive interrelationships between segments of the industry
- Government purchasing practices and their impacts
- The effects of exports and overseas operation on the domestic computer industry
- The future of overseas markets for the U.S. industry.

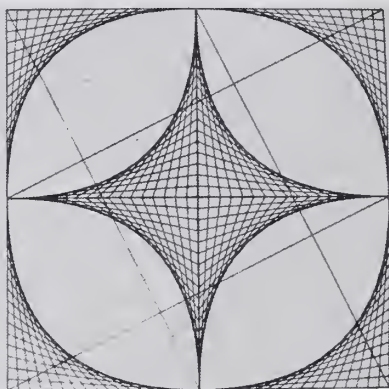
"It would seem especially important to bring into the public view the many cross-currents of thought on matters such as the role of IBM in the computer industry," according to the report.

"We therefore envision that the commission, in addition to soliciting position papers and organizing study sessions with various experts, will hold early public hearings at which all interested parties can express their views."

"We believe that the study is urgently needed," the authors conclude. "It is feasible. We hope that it will begin soon."



Students suggest a variety of designs and design combinations. The software develops the designs into complex but eye-appealing drawings such as these.



Architects Get More Than Sketchy Help

LEXINGTON, Ky. — "The architect is the last person to think about using the computer — and he is finding it's as useful a tool for him as for anyone else."

In describing a series of computer exercises he developed for students in the University of Kentucky's college of architecture, Prof. Michael Kennedy also said: "Instead of relying totally on his memory and intuitive reasoning, the new architect has the power of computers at his disposal in developing sketches, models, information systems and a wide variety of

'Super Rats' Flaws Analyzed

LONDON — The Natural Environment Council is financing a study of rodent populations of "super-rats" which are resistant to the poison, Warfarin.

Data collected in the field by a research student will be used to construct a computer model to predict the results of control strategies.

Workers in the Ministry of Agriculture's pest section examining the poison resistance in rats and mice are finding that the "super-rat" is susceptible to other methods of control. One possibility being studied is the "super-rats" higher than normal need for the antidote for Warfarin, vitamin K.

other functions."

Two such programs already are in use in the college:

- Environmental Sketches in Perspective (ESP) is a system to automate the often time-consuming task of producing three-dimensional drawings. To use the system, a student defines a specific kind of building and its elements. To use the elements in different ways, the student has only to call out the appropriate symbol and the computer provides the scaling and calculations necessary to change the drawings, building up the perspective drawing systematically and producing a finished sketch by means of a plotter.

- Pattern Generation Language (Pagan) is another set of computer programs which capitalize on a student's creativity by giving him opportunities to explore whatever options occur to him. Students suggest a variety of designs and design combinations. The computer takes over, generating — or developing — the designs into complex but eye-appealing drawings, again by means of the computer-linked plotter.

Under development at the college are other systems for use by architects in cost projection and information retrieval.

Calif. Board Votes Software Exemption

By Marvin Smalheiser

CW Correspondent

SACRAMENTO, Calif. — A bill that would give users and vendors a two-year reprieve from taxes on software was approved last week by a 7-0 vote of the Senate Revenue and Taxation Committee. It could be passed by the full Senate this week.

The bill states that computer software would be assessed as if there were no program on it. It could become law in a couple of weeks if the assembly agrees to some amendments by the Senate Committee.

One of the amendments eliminates an assembly provision that software sold with a computer would be valued as a unit with the computer.

The bill passed in the assembly by a vote of 71 to 1 [CW, April 12], but the Senate committee amendment could stir up some opposition in the assembly.

The bill, if it becomes law, would head off a move by California county assessors to put software on the tax roll by assessing it as tangible personal property.

It is designed to prevent such action for at least two years so further studies can be made on the problem of taxing software.

RCA's Computer Withdrawal Spurred Justice on IBM Suit

WASHINGTON, D.C. — The demise of the RCA computer business was the major spur to renewed antitrust action against IBM by the Department of Justice.

The department, in a little noticed filing in January with the U.S. District Court for the Southern District of New York, indicated that other mainframe companies might follow RCA and General Electric out of the business if the suit were not settled quickly.

The statement is included in a chapter in the study on government regulation by the two Afips officers.

RCA dropped out of the business, the affidavit said, because of "certain stated reasons, including the dominant presence of IBM in the computer industry and the slow progress of [this] suit."

The affidavit sought to have a single

judge assigned to the case, a move since made with the assignment of Judge Daniel Edelson, who also handled the last antitrust suit against the firm which resulted in the 1956 Consent Decree.

"A complicating factor in determining appropriate relief" in the case, the affidavit said, "is presented by the recent change in the structure of the general-purpose digital computer industry."

"Plaintiff [the government] estimates IBM's share of this market as in excess of 70%."

The six competitors in the market — Burroughs, NCR, Control Data, Sperry Rand, Honeywell and Xerox are only slightly larger than IBM alone, "taking their total sales in all their diversified commercial activities," Justice said.

"In the relevant computer market, no one of these corporations has as much as a 10% share, and their combined share is substantially less than 30%."

"If corporations the size of RCA and General Electric have found it impossible to survive in the computer market, these six remaining competitors of IBM in computers are patently vulnerable."

"Their demise as competitors during the pendency of this action, or the demise of any of them, will unquestionably render ultimate relief more difficult if the government prevails on the merits, perhaps to an even greater extent than that occasioned by the demise of RCA and General Electric."

'Little Progress'

The Justice affidavit notes that the original action was filed in January 1969 and that it "has made relatively little progress in meaningful discovery and preparation for trial."

Furthermore, the affidavit said that five courses of action were needed to bring the case to an early trial:

- "Circumscribing, even tentatively, the complicated issues of market definition, market structure and marketplace conduct that will be tried for guidance and control of the pretrial preparation of the case
- "Isolating the noncontroversial areas of the case for possible stipulation
- "Defining subject matter, time frame and other limitations upon discovery so that the parties would not be deluged with mountains of useless paper
- "Scheduling the progress and priorities of discovery proceedings
- "Establishing cutoff dates where appropriate, for confining the initial phases of discovery within manageable bounds."

The government also said that even though it had received over 25 million documents from IBM in the case, "approximately 150,000 to 200,000 documents have been withheld... on claims of privilege, the grounds for which claims remain undisclosed."

In reference to the Justice action, IBM said, "We don't think it is appropriate to comment on matters such as these which have come before the court."

Where's Next World Trouble Spot? Data Base From News Clips May Tell

LOS ANGELES — A political scientist at the University of Southern California believes computer analysis can help experts anticipate future trouble spots in the realm of international political behavior.

Dr. Charles A. McClelland compiles a data base of relations between countries. He can illustrate this interplay with computer-generated graphs showing the ups and downs of political life between any of 169 nations around the world — more than 25,000 pairs of countries in all.

Now in its fifth year, the federally funded project is built on thousands of facts culled from the *Los Angeles Times*, *London Times* and *New York Times*. The studies are being carried on in the international relations department's research institute which McClelland directs.

One of McClelland's biggest tasks is in keeping up with his data. Each item from the three source newspapers dealing with international affairs is clipped, and a coded version goes onto a punched card and is stored in the IBM 370/155 computer. A single day's crop may exceed one hundred articles.

"We clip every item that crosses a national boundary," he explained. "As long as it in some way relates to the dealings between two countries, we include it in our model."

Coding System

"First we assigned each nation a permanent code number," he said. "Then we established 63 categories of international political activity, from the mildest sort of action to outright war."

"Number 013, for instance, records a nation's admission of guilt, an apology to another nation or verbal retreat. From there we go through comments, praise, promises and assurances, expressions of regret, diplomatic recognition, giving economic aid, giving military aid, agreements and proposals."

The next category is rejection — of a treaty offer, for instance.

Then come such increasingly offensive actions as charges, denunciations, complaints, protests, demands, threats, demonstrations, armed displays, cancellation of treaties or aid, breaking off of diplomatic relations, expulsion of envoys, detentions and arrests, non-military injury or destruction and finally military force.

"Thus when Denmark recently announced that it planned formal recognition of the new nation of Bangladesh, the item was coded 390-025-765 on the IBM card," McClelland said. "The 390 is Den-

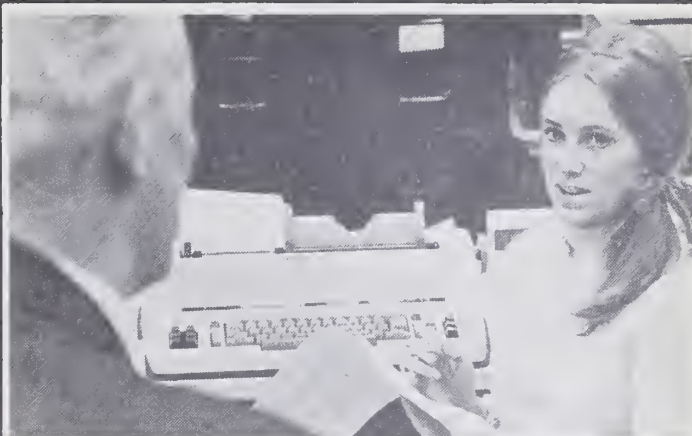
mark's permanent number, the 025 reflects a statement of policy and the 765 represents Bangladesh."

When Denmark formally recognizes the new Asian nation, the action will be coded 390-064-765, the 064 denoting diplomatic recognition.

"At any time, then, we can get back from the computer a complete listing of all the goings-on between any two countries," McClelland said. "And when we direct the system to plot out the results in graph form, we can see both the number of transactions between these countries and the seriousness of those actions."

"It seems apparent that patterns of international conduct can be boiled down and sorted out by computer," he said. "For instance, we can expect to discover that a certain nation always makes threats before it strikes, always says things in the same kind of language."

"Once such a pattern is established, we could be better able to figure out in advance what's likely to happen in a particular world trouble spot — or pinpoint such a trouble spot before the situation gets totally out of hand," he said.



Lawful Speeding

Indiana drivers are getting new licenses and renewals faster as a result of the state's recently implemented computer license network. Driver information is typed into one of 190 computer terminals located throughout the state, and the information is transmitted instantaneously to the Bureau of Motor Vehicles central IBM 360/65 computer in Indianapolis for an electronic records search. The branch office clerk then inserts a blank driver's license form in the computer terminal carriage, as the bureau's Cindy Railey prepares to do, and the central computer automatically types out the license in about three minutes.

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Book for Europe Users

PHILADELPHIA — Auerbach Publishers Inc. has a new looseleaf reference entitled *Auerbach EDP Notebook/Europe* which covers the significant computers, peripherals and data communications equipment and services sold in Europe by manufacturers in Europe and the U.S. It is prepared by an Auerbach editorial staff in London.

The two-volume *Auerbach EDP Notebook/Europe* costs \$245. Additional information may be obtained from Auerbach Publishers Inc., Department 472, 121 N. Broad Street, Philadelphia, Pa., 19107.

Survey to Cover DP Salaries

LAKE BLUFF, Ill. — Salaries of software (systems) programmers will be reported separately from those of applications programmers in the 1972 *Weber Salary Survey on Data Processing Positions*. Changing technology has brought about a sharp increase in the number of firms employing software specialists, yet salary data relating to this job family has been hard to get.

Materials for participation in the survey are available from Philip H. Weber Salary Administration Services, A.S. Hansen, Inc., 1080 Green Bay Road, Lake Bluff, Ill. 60044.

Independent Packages 'Most Lucrative Area'

DETROIT — Independent packages to enhance user operating systems can be the "most lucrative area" to make software changes to user systems, according to Tim McDonough of the Detroit Edison systems research staff.

In-house-developed software modifications to operating sys-

Operational Efficiency

tems should be "relatively simple changes that bring large returns," McDonough told his workshop at the Great Lakes Computer Users' Forum. One successful modification at Detroit Edison involved a method to control data set use. This included a change to an OS macro to replace the data set creation date with the date it was opened, he said.

One successful outside package implementation was the use of a report generator package, McDonough said. The package is fast becoming the largest-used program at Detroit Edison, partly because it allows changes to be made to output reports without OS systems software changes, he added.

In 1969, Detroit Edison was considering the acquisition of a 360/65 to upgrade its dual

Model 50 installation, McDonough said. But first it applied an independent hardware monitor to the processors which showed that the electric company was getting only 25% utilization from its CPU.

Alan Emery, assistant director of the computer center at Michigan University, told his workshop attendees that as much programming as possible should be done on main CPUs as opposed to satellite processors. Smaller systems should be reserved for specific dedicated applications, he added.

Small satellite systems are justified when privacy and control over who has access to stored information is important, Emery said.

Users of small computers may need to install new peripherals if they choose core extensions to increase operational efficiency, noted Dick Jesky of Chatham Supermarkets.

Jesky upgraded his 360/30 to 96K so he could multiprogram, but this was impossible without adding 2311 disk drives.

The extended core increased his CPU usage to 85% of clock time and delayed a potential upgrade in hardware, Jesky said.

At the independent peripherals session, Tom Greff of American Motors said the economic and performance aspects are the most important in evaluating whether to stay with IBM peripherals.

American Motors has 50 disk drives on its assortment of 360/40s and 50s. Thirty-five of the disk drives are from Memorex, the others from Calcomp.

Of American's 32 tape drives, 17 are from Telex, 13 from IBM and two IBM drives are on lease from a third party.

Regarding reliability and support of these devices, he commented that "Memorex customer support is superior to IBM's," and the support from the other two vendors is "at least as good as that from the mainframe vendor."

DETROIT — Dial-up lines from the phone company are "very adequate for the majority of data applications," according to Conrad Masterson of Ford Motor Co.'s communications and DP operations department. In many cases, Bell will help users improve the quality of their dial-up lines, if the user can supply enough detailed data for the phone company to pinpoint the problem, he said.

Admitting that Ford might have more "clout" with its phone companies than other users, Masterson suggested that users deal directly with AT&T Long Lines when local operating companies are unable to solve their data transmission problems. Long Lines often can "cut across" local jurisdictions within the Bell System to aid the user, he added.

In evaluating independent data equipment, Masterson urged users to insist on a "live demonstration" at their site before deciding. Users should not select a

...At the Great Lakes User Caravan



(CW Photos by E.J. Bride)

Attendees at the data entry workshop hear particulars about keypunch replacement.

Environment Big Factor in Productivity

DETROIT — Environmental factors at a keypunch installation can help increase productivity, according to Gary Clickard of Ford Motor's computer planning staff.

Speaking at an overflow workshop session of over 60 users, Clickard said that happy, relaxed operators make fewer errors. As part of its environmental improvement program, Ford reduced equipment noise levels, installed carpeting in keypunch areas and painted walls in soft colors, Clickard said. In addition, large work areas were reduced into smaller individual rooms to give keypunch operators "more identity."

From a system standpoint, data presentations of forms were arranged with simplified codes,

and eye travel for operators was reduced by moving source documents close to the keyboard, he said. During the session, four major keypunch areas from basic equipment to key-to-disk sys-

tronic units are installed at various academic departments to access a centralized data base stored in a 360/67, Westervelt said.

Students can also access the CPU via Touch-Tone phones tied to an IBM 7772 audio response system.

For hard-copy printouts, a user can call the system from a phone, order a hard copy to be printed and receive a verbal order number from the response system. The user can then go to the DP center or other site where the hard copy is usually waiting, the DP director said.

Intelligent data terminals can be used for both data entry and data preparation, noted Emil Hipsky of Michigan Blue Shield (MBS).

Noting his organization is "always looking for newer ways" to handle increasing volumes of data, Hipsky said MBS has a combination of intelligent terminals and CRTs for direct data entry.

While the intelligent terminals are used mostly for formatting inquiries into a customer information system, and not to their full capabilities, their usage has reduced response time from four or five days to one day, Hipsky said.

Panelist O.E. Stolberg of United Air Lines reminded users that the cost of OCR equipment may be high, but this gear can result in savings if proper controls and reject-handling procedures are implemented.

Data Entry

tems were evaluated. Buffered keypunches resulted in less errors because operators felt "more secure with an on-line" error-correction capability.

In a workshop on direct data entry, Dr. Frank Westervelt, director of the Wayne State University DP center, described the school's terminal system which utilizes on-line IBM Magnetic Card Selectric Typewriter devices. The magnetic card Selec-



Chuck Dawson, marketing representative for Trendata, explains Model 2000 T/S terminal to Mike Green of Wayne State University.

Demand 'Live Demonstration' From Independents

non-carrier device simply because of a lower price tag, he said, cautioning his workshop attendees that IBM and AT&T will try to use "scare tactics" to prevent new equipment choices.

One user asked Masterson how to deal with conservative man-

Communications

agers who are hesitant to leave established equipment vendors. Masterson suggested that non-carrier equipment be introduced gradually until an overall confidence level can be established.

In a dial-up line application, Joe Mayfield of the Michigan Credit Union League described his firm's network which allows several hundred credit unions to access a central data base.

Calling his network a "poor man's real-time system," Mayfield said many of his remote credit sites had staff members with little DP knowledge.

To configure a simple access system, Mayfield's firm equipped all offices with Bell card dialers. Using precoded access dial cards, each office can access the central data base for credit information within a 23-second response time, he said. Inquiries from remote Touch-Tone telephones are answered by an audio response system.

In areas with dial phones, a Touch-Tone pad was added, Mayfield said.

In a related accounting operation, all remote credit offices update their files at the central site via key-to-tape units which are polled automatically by the 370/145 during off-peak hours, he said.

The type of line used for data transmission, i.e. leased line or dial-up, is often the last element of a communications network to be designed, according to Lloyd Isaacs, director of telecommunications for Chrysler Corp.

Considerations other than the

data transmission itself enter into that decision, he noted, using error-correction techniques as one example. Some error-correction schemes are applicable only to a private line, he noted.

"If you require full duplex," he added, this is "rather difficult, though not impossible, on dial-up."

The economics of leased lines versus dial-up "go beyond the line facilities themselves," he added. There is a greater variety of modems available to leased-line users, he stated, since AT&T gives users greater flexibility with these lines than with dial-up.

Chrysler is one of the Bell System's largest data users, with 105,000 circuit-miles in its data communications network. Regarding satellite data transmission, Isaacs predicted the FCC would bring about a semblance of competition in "local distribution" to users by allowing the individual users to construct ground stations on their own buildings.

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Truckers' License Plates Held Up

DES MOINES, Iowa — A combination programming and keypunch error is responsible for a delay in the issuance of new license plates to some interstate truckers, according to the Iowa Reciprocity Board.

Steven Schoenebaum, the board's executive secretary, said a few trucks may have been stopped because law enforcement authorities in other states were unaware of the deadline extension to May 15 for having plates mounted.

He said he is issuing letters and wires of authority

News Wrapup

to these truckers and expects all trucks to have the plates by May 15.

Unsafe Coal Mines Get Watchdog

WASHINGTON, D.C. — The U.S. Bureau of Mines recently inaugurated a computerized system to determine the nation's most unsafe coal mines and provide a means for more effective enforcement of federal safety standards.

A computer will print out a quarterly ranking of mines based on health and safety violations and accident frequency records. All mine operators are required to report non-fatal accidents within 72 hours and fatal accidents and major disasters immediately. Those mines with particularly poor records will be subject to more frequent and intensive inspections.

Bureau officials said the new system will supplement existing measures and provide a more accurate comparison of mine safety records.

Prison to Aid Navy DP

WASHINGTON, D.C. — A contract between the Navy and the Federal Prison Industries Inc. calls for the provision of data processing production support for the Navy's Ship Equipment Configuration Accounting System (Secas) program.

Federal Prison Industries, a wholly owned government firm, gives employment training and rehabilitation to federal offenders.

The contract will allow the inmates to earn a small income while performing work which will aid in securing jobs upon release from the institution. The production support provided will be conducted at the Federal Reformatory for Women in West Virginia.

The staff will consist of six key-to-tape and 10 clerical personnel, all reformatory residents. A DP link will connect the reformatory with the Navy's computer site in Maryland.

Secas will enable the Navy to maintain an accurate inventory of all equipment on its ships throughout the world.

School Assigning Facilitated

GREENSBORO, N.C. — School officials here are planning to computerize the distribution of pupils throughout the city in order to more accurately assign students to the city's schools.

A block-by-block analysis of students' residences that can be constantly updated will help officials rezone school districts to provide racial balancing for next fall.

The computer will also be used to determine exactly what each change means to the schools affected, especially when changes involve more than one school.

Smoking Bad, Aussies Find

MELBOURNE, Australia — A computer at Australia's largest research organization, the Walter and Eliza Hall Institute of Medical Research, has established that smoking cigarettes causes bronchitis and stomach ulcers, and is closely related to other diseases.

Dr. Vance Gledhill, a computer authority, and Dr. John Mathews, a clinical specialist, said the computer linked smoking with a "large range of diseases."

"The symptom of smoking, and particularly smoking heavily, has shown up with a positive weighting factor for diseases, such as bronchitis and stomach ulcer," Mathews said.

Mathews said he expected other associa-

tions to show up as the computer gathered more information. The researchers asked 157 patients to fill out a "self-administered symptom history."

Canada Mulls 3-Way DP Plan

OTTAWA — The Treasury Board is following the recommendations of a year-long study into government DP equipment and will establish a computer system under three broad categories.

Departmental computer centers will be used for specialized or confidential matters within government departments; other centers will be used to serve departments or agencies on specific topics; and others will be used to serve several departments or agencies with related computer needs.

'The Computer Made Me Do It'

ZAGREB, Yugoslavia — The computer was the unwilling mouthpiece for the suppressed emotions of some students here, but the students may pay the price.

Police arrested five students at the data processing center after the computer returned slips of paper on which were printed anti-government slogans instead of the desired business or trade data.

The students face charges of sedition and hostility to the state.

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Official Cites Underutilization

Underdeveloped Countries 'Oversold' by IBM, ICL

By Joseph Hanlon

Special to Computerworld

LONDON — Underdeveloped countries make poor use of their computers, primarily because IBM and ICL sell them third-generation equipment when accounting machines or second-generation computers will suffice.

Winston C. Riley, head of the United Nations International Labor Office MIS/EDP unit, also charged that most Third World computers are used only six hours a day, usually for inappropriate purposes. Seventy-five percent of the computer use in these countries concerns accounting applications, he said. These are labor-saving uses, which are ridiculous in underdeveloped countries with labor surpluses, Riley declared. Even if automation is desired, accounting machines or 1401s would be adequate, he added.

The U.N. has several computer advisers working in these countries, but Riley said they are usually in a country only once a year, and thus cannot hope to have as much influence as IBM and ICL.

Speaking at the Infotech State-of-the-Art seminar "1980," Riley noted that most underdeveloped countries have IBM and ICL machines — other vendors only enter the largest countries. The most common machines are 360/20s and 30s. These countries would be better off

with second hand, second-generation machines Riley noted, because they are well debugged and have good applications programs, compared to the 360 and 370 series which are still not fully debugged. Also, IBM and ICL demand most of their payments in hard currency, which means that new computers impose a major strain on limited foreign exchange.

Overselling results, Riley explained, because the most knowledgeable computer people in the Third World usually work for IBM and ICL. When local people turn to these experts for help, the experts inevitably recommend their own products. Thus, the majority of current orders in the underdeveloped countries is for System 3.

Lack Trained Staff

In underdeveloped countries trained people are scarce — it is impossible to go to another firm to get an assistant DP

manager to run your center, Riley noted. And users often buy the computer before there are people trained to run it.

The traditional staff training method in underdeveloped countries of bringing in a foreigner for a year or two to run a center simply does not work, Riley noted. The foreigner tends to do the interesting jobs himself and neglect the training.

In Eastern Europe, the bootstrap method is more common, with everyone learning together without outside aid. But it is a long, slow process with no one to turn to in case of trouble, and this has resulted in inefficient, large programming teams for even small projects.

Who Uses Computers?

The three major users of computers in the underdeveloped countries are the governments themselves, the multinational firms and universities. Governments use

computers for statistical data and labor saving on data input, but rarely for planning or to improve services.

The multinational corporations use their computers to preprocess data for the head office computer. The local computer is usually brought in with software, which means that local people get no programming experience, Riley said.

Universities are often as far advanced in computer science and cybernetics as those in the developed countries, but this hardly benefits the Third World because the university experts cannot help with the down-to-earth problems faced in government and industry, Riley claimed.

Despite his complaints about misuse of computers, Riley noted that a few third-generation computers were intelligently used. And, in some circumstances computerization has been important in imposing Western-style control methods.

Turnpike Authority Gets Facts on Traffic

NEW BRUNSWICK, N.J. — The roaring traffic on one of the world's busiest turnpikes is quietly and quickly analyzed each day by a computer at the headquarters of the New Jersey Turnpike Authority here.

Reports generated by the computer show exactly how much traffic has passed each of 25 interchanges, what direction they were traveling, how much money has been collected and extensive other information needed by the Authority.

Over 100-million punched card toll tickets were collected at Jersey Turnpike exits in 1971 and the traffic is increasing about 10% a year. All of the tickets are processed by a Univac 9400.

The toll tickets are 80-column punched cards, prepunched by the computer system to show the entrance interchange and class of vehicle, such as automobile, truck or bus.

Every day couriers collect the tickets, and deliver the cards to the Turnpike Authority in New Brunswick.

The 9400 audits all the collections, automatically comparing its totals with the bank deposits and with the vehicle axle counts from treadles at interchange booths. Daily reports are completed 30 minutes after all tickets have been processed.



Data from over 100-million toll tickets a year is processed by this Univac 9400 computer at the New Jersey Turnpike's administration building in New Brunswick.

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'Civic-Minded Businessmen'

DPers Find Free Consulting for City 'Rewarding'



Some of the people involved in Chicago's new teleprocessing system are (left to right) Eric Mowitz, Robert Carlton, James Woods and David Risku.

By E. Drake Lundell Jr.

Of the CW Staff

CHICAGO — Two DP professionals are giving the city of Chicago's computer operation free technical advice and training while performing their regular full-time jobs in private industry.

The program works like a "mini-Guide or Share," James Mitchell, technical services manager of the Chicago Datacenter, said in describing the arrangement with David Risku and Eric Mowitz of Inland Steel Corp.

The two contribute eight hours a week to the city and are primarily consultants to help the personnel of the center develop new applications and find new ways of operating the center, in addition to advising the city personnel on successful applications in industry.

The two "have showed us the better way to do things, but have not done them for us," according to Mitchell.

The reasons for taking on the additional work, according to Risku, assistant manager of Inland's systems programming division, were "information exchange and exposure to different organizations and hardware configurations."

Not a One-Way Street

The program, of course, is not a one-way street, according to Mowitz, a systems programmer with Inland. "Discussions with the Datacenter's technical services and systems programming personnel have really been rewarding. That's where you hear about hidden implications — in the day-to-day work with the computer," he said.

The two consultants have over five years' experience with Inland which enables them to "assist the Datacenter in solving its own problems by educating its personnel and encouraging penetrating discussions of possible solutions."

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Similar Installations

The city and Inland computer centers both employ approximately the same number of people and both serve as centralized DP centers for their organizations.

Both are IBM users, with the Chicago Datacenter presently installing a 370/155 and Inland operating on 65s. The Chicago center serves 25 city departments and Inland's center serves as a corporate data center for all of its departments and four subsidiaries.

Personal Satisfaction

The impetus in starting the experiment was the wife of one of the consultants — Pam Mowitz, a former employee of the city's Model Cities program.

She suggested to her husband and Risku that they might get more satisfaction out of their work if they felt useful to more people — especially through local government.

The two were challenged by the prospect of working with the city's DP operation, because it offered a completely different set of problems than they found in the business environment at Inland.

The program helps them develop their own personal capabilities, they said, and also gives them satisfaction from participating in more effective local government.

"I frankly didn't know what to expect," said Paul J. Kole, director of the city facility, who initially accepted the proposal for free consulting.

"I did know," Kole said, however, "of Inland's successful reputation in data processing and believed that even if we just compared notes it could be a tremendous resource for us. But it went beyond that and I'm glad we gave it a try."

Chicago Mayor Richard J. Daley indicated he "would like to see the idea expanded."

City Comptroller David E. Stahl agreed such cooperation "should be continued and encouraged. We need more civic-minded businesses and businessmen to work with municipal employees to meet the challenges which today's cities offer."

Typical Projects

Risku and Mowitz also aided the center in a conversions from MFT to MVT, in the evaluation of terminal equipment and in an evaluation of teleprocessing monitors.

As a result of the study, they were "instrumental" in the technical services division's recommendation that the city develop its own teleprocessing system. They made this recommendation based on their experience in developing such a system for Inland.

The Datacenter teleprocessing system differs from the Inland one, however. The personnel from Inland showed the city staff "how it could be done."



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Editorial

Keeping the Heat On

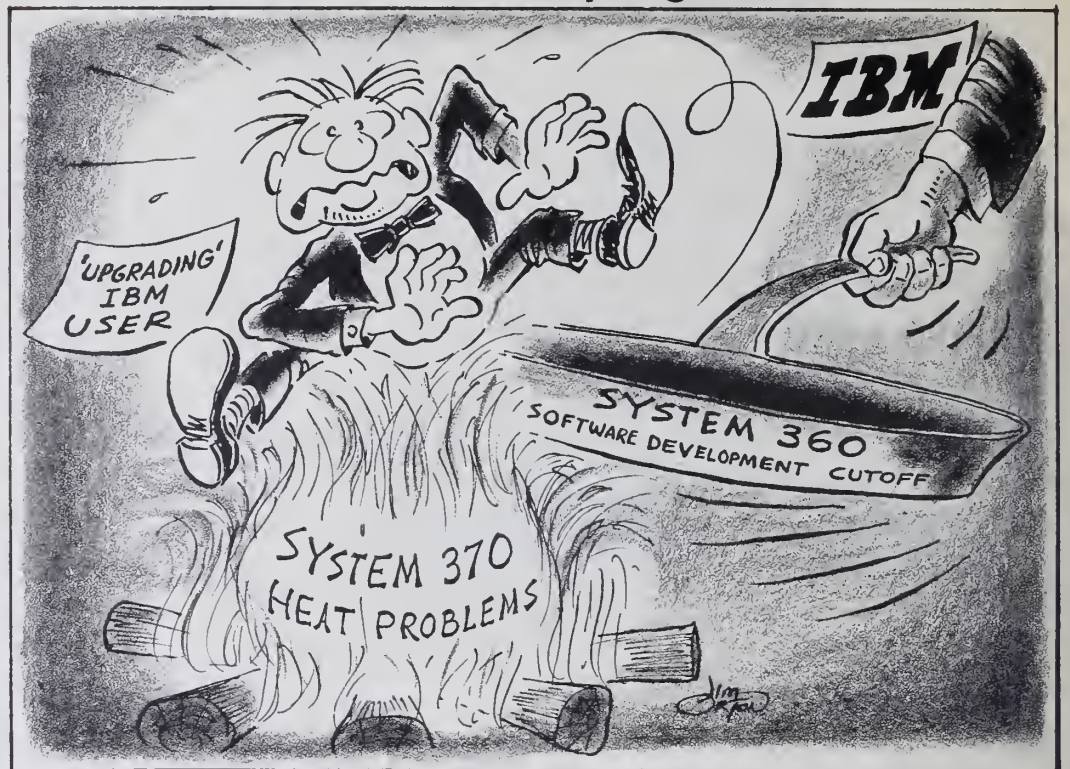
Computer users can and must keep the pressure on their elected officials and the Justice Department to ensure that the government's antitrust suit against IBM is prosecuted vigorously.

The Justice Department has presently given top priority to the case, but political motivations may have forced that decision.

Criticism of Justice's handling of the ITT case and mounting political pressure against large businesses may have figured in advancing the investigation.

But users must not let the issue slip into the background again. By keeping congressional and presidential candidates "informed," the issue will remain active.

Out of the Frying Pan



Letters to the Editor

Glorifying Technical Skills At Expense of Common Sense

The General Services Administration job descriptions for EDP [CW, April 19] reflect the crippling attitudes of the industry.

None of the descriptions includes the responsibility for understanding the functions or economics of the user or for insuring that a system has adequate internal controls that are integrated with clerical procedures.

The project manager's description fails

to emphasize project control or supervision of the system checkout, and it does not mention the need to estimate implementation tasks, test time requirements or operating economics.

The descriptions stress experience in terms of years when it would be more pertinent to judge experience in terms of how well it has equipped a person to anticipate and plan for potential problems.

Until the industry stops glorifying technical skills (clearly a tendency of the descriptions) at the expense of management ability and common sense, we will

continue to squander resources at a prodigious rate.

Ash Pipkin

New York, N.Y.

British Group Seeks Data On Computer Periodicals

The Aslib Computer Information Group, which is concerned with problems of information provision and handling in the computer industry, is preparing a second edition of the *World List of Computer Periodicals* (first published by The National Computing Centre Ltd.).

We are most anxious to include details of all newsletters or other periodicals published by computer organizations throughout the world. This particularly means such bodies as manufacturers, software houses, services bureaus, consultants, university or company computing centers. Information on these periodicals is not usually included in lists of periodicals published by such organizations as the Library of Congress.

I would like any organization which issues a newsletter or periodical to send a sample copy or information about the periodical to me so that it may be included in the new edition of the *World List*.

Alan Pritchard

c/o The National Computing Centre Ltd.
Quay House, Quay St., Manchester
M3 3HU, England

A Strange Fact...or Fiction?

The headline says "Study... Warns of Public Backlash" [CW, April 12]. That's a laugh.

My local bookstore has one book about computers. It (non-fiction) is filed ("there's no other place to put it") with the science fiction.

How goes the (computer) revolution?

William Fitzpatrick

Long Beach, Calif.

Key-to-Disk Gets Better

I want to take exception with Mary Lanahan, the panelist from Pacific Gas & Electric, on key-to-disk data entry [CW, April 19].

I don't know how many keystations or what kind she is using, but we found our operators could make the change and exceed their card production in two weeks. In addition, our monthly average production for 14 operators exceeds 18,000 keystroke/hr.

As far as equipment costs, we found it was a push if you consider card costs

along with hardware. I do agree with her that there is a savings in personnel; for us it was much more dramatic.

For the record, our system has been installed 17 months and we have an operator incentive system that may account for our increased performance.

David A. Reser

Director of Data Processing

Petrolane

Long Beach, Calif.

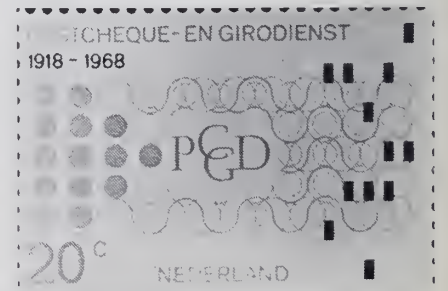
Stamp Honors Dutch Giro

Computerworld readers might like to see the attached stamp (commemorating the Dutch giro system) with a punched-card motif, which was omitted in the survey of computer-related postage stamps [CW, March 29].

T.D.C. Kuch

Bethesda, Md.

Lack of space at the time prevented the use of the Dutch stamp. Ed.



Dutch stamp has punched-card motif.

Microprogramming's Mark

Regarding Alan Taylor's April 19 report, I have seen advertisements under "software for sale" in *Computerworld*, utilizing microprogramming capabilities of the IBM Model 25, which Taylor denies hearing of. It was a soft core extension onto the disk and sold for around \$2,500.

The utility of microprogramming to express basic processes on computers will become a significant contribution to the future state-of-the-art, as I point out in my forthcoming thesis.

M.J. Viehman

Tetra Tech, Inc.

San Diego, Calif.

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

Economic Considerations Should Dictate Copyright or Patent Use

By Martin J. O'Donnell

Special to Computerworld

Dr. Bryan Niblett may indeed be right in his assessment that copyrights are preferable to patents for computer programs [CW, March 8] but, if he is, it is for the wrong reason.

Niblett asserts he dislikes patents for software because of the requirement that the basic idea must be described in order to obtain a patent and this might allow someone to use the idea without infringing.

What he overlooks is that the disclosure required for copyright purposes is generally more extensive since one must disclose the program itself, not merely its basic concept, in order to copyright the program.

Scope of Protection

Further, the scope of protection obtainable by copyright is quite different than that obtainable by patent. A copyright on a program prevents one from duplicating it either identically or with only minor alterations. It does not prevent one from extracting its basic essence and using that as the core of a new program.

Often, however, it is the basic concept of the program which gives it value, and in such circumstances only a patent can prevent the unauthorized appropriation of that concept by others.

Obtaining a copyright on a flowchart is ineffective in protecting the concept, since it does not prevent others from using the identical flowchart as the basis of their program, but only prevents them from reproducing the flowchart in pictorial form and essentially unaltered.

The questions of copyright versus

patent under the law as it presently exists must ultimately be decided on the basis of business considerations and economics. If the program has involved little expenditure of time and money and does not appear to possess any significant novel features or advantages, then it is most probably not worth patenting, and, ac-

Viewpoint

cordingly, whatever protection can be obtained at minimal expense should be sought. This generally means copyright.

On the other hand, when a large amount of time and money has been spent in developing the program, and if the program possesses some novel features or advantages, it is probably worthwhile to protect the investment by means of a patent, since a copyright cannot really do so.

The British reasons for recommending refusal of patentability to computer programs are very similar to those advanced earlier in the U.S. by the U.S. Patent Office.

However, the Court of Customs and the Patent Appeals disagreed with the Patent Office position and in fact recently required it to issue patents on software.

The question of patentability is not yet resolved, since the issue of patentability of computer programs is now pending before the U.S. Supreme Court. A decision on this question is expected sometime during this year.

Martin O'Donnell is an attorney with a Boston, Mass., firm specializing in patent and trademark cases.

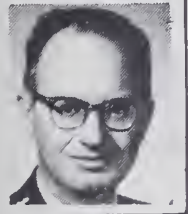
They Must Accept CPA's Role

CDPers Can Now Hold Up EDP's Arch of Quality

CDPers often discuss the idea that the holder of the CDP should have the equivalent professional position in data processing that the CPA has in the accounting profession. Unfortunately, they often do not define just what the essential CPA role is — and instead seem to confuse it with some form of advanced degree that makes its holder a professionally superior being!

This fact is doubly unfortunate, both because of its own impracticality, and also because the DP profession actually does now need people prepared to undertake the role of the CPA — and the 12,000-odd CDPers could well provide the profession with the necessary trained workforce.

The Taylor Report By Alan Taylor, CDP



CPA Need Suggested

The need of the DP profession for a "CPA"-type operation has been described best by the Afips Systems Improvement Committee.

John Gosden, committee chairman, talking about the structure of future standard enforcements, suggested that a certificate might be required for certain cases. The certificate would be given by a professional person, and would state that certain standard tests had been made, that certain standard questions had been asked, and that the responses received had been satisfactory.

In fact, the certificate would be much like a CPA certificate. It would not say that everything had been done exactly the way the examiner would personally like to see it done. Instead, it would say that everything had been done in accordance with some known standards.

The Real CPA Role

This then is the real CPA role. CPAs do not need to be better accountants than non-CPAs — even though this may often be true. They do not need the right to enforce their own personal standards upon the work of other accountants. They do not even need the right to determine standards for accounting work!

The CPAs merely need to be able to examine accounts sufficiently well so that they can check on whether or not a particular set of standards has been adhered to. And they need the guts to be prepared to give, or refuse, their certificates accordingly. (Certificate as used here is the certificate the CPA gives after examining a set of accounts — it is not the certificate the accounting profession gives to say he is qualified to examine the accounts.)

On the surface this role does not appear to be particularly glamorous. It does not even appear to be particularly demanding. It is a role which any competent craftsman should, presumably, be able to perform.

And yet it is one which has brought to the CPAs a reputation for accounting preeminence. The role has brought them exactly that professional reputation that is currently the envy of many CDP holders.

To know why requires an understanding of the true value of the CPA certificate — something quite different from a valuation of the time and effort that the CPA expends when he audits an accounting operation. The time and effort are simply the cost of obtaining the certificate, and this has no necessary relationship to its value!

Certificate's Real Value

The real value of the CPA certificate is in the improved accounting structure that must have been adopted — perhaps by non-CPAs — in order to pass the CPA test! The CPA's work may be minor, but to get his approval all the accounting has to be done with an eye upon the particular standards.

And it is this fact, that the accounting throughout is done in accordance with the accepted standards, whatever they are, that makes the CPA's certificate valued. In turn, this value makes the CPA himself valued.

In some ways it can be said that a CPA certificate is like the keystone of an arch. Superficially an arch looks as though both sides had been built speci-

"A CPA certificate helps ensure that the accounts of the corporation are 'self-supporting' because it brings with it the assurance of support from outside the corporation, just as the keystone ensures the support of the rest of the structure."

fically to support the keystone, which is placed in the middle of the arch above the heads of the passersby.

In fact, the operations are reversed. Without a keystone the arch will not stand because neither of the sides are themselves self-supporting. Only through the transmission of support from one side to the other through the keystone will the structure stand.

In the same way, a CPA certificate helps ensure that the accounts of the corporation are "self-supporting," because it brings with it the assurance of support from outside the corporation, just as the keystone ensures the support of the rest of the structure.

Certificates in Data Processing

If a CDPer performs the same service of checking a data processing application against known standards, he would not have to be regarded as a better data processor than the people whose work he was checking. The value of his work to the profession would not be limited by the number of hours it would take him to ask the appropriate questions, or to make the appropriate tests.

The value — and it would be great — would originate exactly as the value of the CPA certificate does. It would come from ensuring the day-to-day checking

against the standards involved by the programmers, analysts and operations people.

The CDP itself, again like the keystone, would be a piece of overhead — but one which would allow a quality structure to be more easily created, and much more easily maintained in good order. However, the professional work itself would continue to be performed by non-CDPers!

Cost of CPA Status

If the CDPers really do wish to have the CPA status they talk about, they will have to realize this does not make them an elite and, even more, that this means there must be other working professionals who may never need to have the CDP. The value of the CPA certificate is based on the value of one accountant checking the work of other accountants, and, if there were no other accountants than CPAs, then the value of the certificate would drop disastrously!

In responding to the questionnaire on "Have We Formed a Wrong Society?" [CW, March 15, April 5], many CDPers voted that their own society, The Society of Certified Data Processors, was adequate to fulfill the needs of the DP profession. In fact, if this were true, their chances of getting the CDP reputation and position of the CPA would probably vanish. The

Professional Opinion on the Value Of a CPA-Like Certificate in DP

1. How valuable would a CPA-like certificate be in improving professionalism in data processing?

- ☐ No real help.
☐ Some help.
☐ Great help.

2. What minimum qualifications should a data processor have to be able to sign a respected CPA-like certificate?

- ☐ Must be better than working professionals involved, in case they "snow" him successfully.
☐ Must be qualified by college-level education, experience.
☐ Must be qualified by professional-level examination and experience.
☐ Need only be qualified by experience.
☐ Other _____

(Please explain. Continue any answers on separate page if necessary.)

Name _____

Address _____

Professional position _____

CDP? ☐ Yes ☐ No SCDP Member? ☐ Yes ☐ No

After completing, please return to Alan Taylor, c/o The Taylor Reports, Computerworld, 797 Washington St., Newton, Mass. 02160.

ion on whether the arguments for the two societies appear convincing to you, or whether or not something has been omitted. There is a questionnaire provided for you to answer some of the main points, your letters on the subject will be greatly wel-

comed.

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NSF-Sponsored Research Could Lead To National Science Computer Network

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. — The National Science Foundation expects to sponsor research which may lead, over the next five years, to a National Science Computer Network, linking universities and other institutions.

The technical details of the network have not yet been determined, but should be easier to settle than the people problems associated with using the network, according to D. Don Aufenkamp of the NSF Office of Computing Activities.

3 Overlapping Areas

The network is expected to serve three sometimes overlapping areas; research or problem-solving, educational uses and science information or data retrieval projects. Limited to these specific areas, the network should provide an unusual opportunity to integrate retrieval services with normal academic computing efforts, Aufenkamp told the spring conference of the Interuniversity

Communications Council (Educom) which met here recently.

NSF is trying to look at organizational, political, and economic problems of the potential users, and to attack these problems sensibly, he said. Only then would the foundation consider what kind of implementation, in terms of a network, it might need, he added.

Funding Vital

The amount of time it takes to make the network operational will depend on funding, but will include at least a year of planning of a substantive nature, a year of putting the hardware, software, communications and people together and three years of operation of a "fairly structured activity."

The initial planning effort, already underway, will include NSF study grants to determine the projects and activities that should become part of the network services, and to lay out the implementation requirements. Work on resource sharing would continue in parallel with the other planning, Aufenkamp noted.

The three years of "fairly structured activity" would be a system test during which NSF, or its designated network manager, would try to look at a good cross-section of the three uses for the network.

It is premature to speculate on the final structure of the network, according to Aufenkamp, but it might involve creation of an Arpa-like (Advanced Research Projects Agency) organization, linking of some or all of the regional university centers now funded by NSF or use of some of the commercially available time-sharing services.

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Program Can Spot Potential Dropouts

HARTFORD, Conn. — A small computer is being used as an "early warning system" to help Hartford Public High School administrators identify potential dropouts.

Called More Alternatives for Students (MAS), the program is funded by the U.S. Office of Education. Edward J. McKenney, project director at the high school said: "One of the overall objectives of MAS is to reduce the dropout rate by at least 20% over the previous year. With the help of the computer-based program, which went into operation last year, the objective is being met."

The first step used at Hartford to spot a potential dropout is the development of a student profile.

Student attendance records are updated on a daily basis. A permanent record is kept for each student including his name, homeroom, counselor, enrollment, courses, classes missed and tardiness.

"After we identify a possible dropout, we can meet with the student and his parents to try and remedy the situation," McKenney said.

Some of the MAS programs offered in addition to regular classes include work-study sessions, reading clinics and credit for correspondence courses. Future plans call for the computer, an IBM System 3 Model 6, to be used in monitoring the progress of MAS students in reading and math.

Fiscal Fiddling Foiled!

Special to Computerworld

CANBERRA, Australia — For many years the average wage-earner in Australia could "fiddle a bit" on his income tax returns by claiming extra prescription, doctor or other deductions. Other taxpayers left out small dividends and didn't pay any tax.

But this practice of small-scale tax evasion on a national scale is now becoming increasingly difficult because the Taxation Department is using a computer to carry out detailed cross-checks on claims above certain levels.

Random Notes

T/S Service Extends CPM To Handle Large Networks

WALTHAM, Mass. — An extended version of CPM (Critical Path Method), developed by a midwestern company, Gnomon, Inc., is now being offered to users in the East on the First Data Corp. time-sharing network.

The CPM software is said to handle networks having up to 1,000 activities and 750 events, providing normal and expedited solutions with either calendar or relative dating.

First Data Corp. is at 400 Totten Pond Road, 02154.

Compupower Offers Mutual Fund Shareholder Accounting Services

NORTH BERGEN, N.J. — Compupower Corp. has been licensed by Computech Systems Inc. of Atlanta, Ga., to offer the Autofund/III Mutual Fund Shareholder Accounting system on a service bureau basis.

The system processes all of the transactions encountered by the mutual fund transfer agent and maintains all records concerning shareholders, dealers, clearance, certificate masters, as well as complete history files on prices and transactions.

Compupower Corp. is at 5701 Kennedy Blvd., 07047.

Policy Writing Simplified

NEW YORK — A new service that simplifies the writing of assigned risk auto insurance policies by using a time-shared computer system to rate, code and print a finished policy is available from The Service Bureau Corp.

Developed by Royal-Globe Insurance Co. for casualty companies that participate in New York and New Jersey assigned risk pools, the new Semi-Automated Assigned Risk System (Saars) uses Call/370 capabilities.

The service will handle both new policies and renewals, with appropriate termination notices produced for the renewals, SBC said.

Sort Available for Model A

NASHUA, N.H. — Gregoire Associates, Inc. has announced the availability of a sort program for the Linolex Model A computer system.

The cassette-based program will allow users to rearrange existing data in any desired order, regardless of the sequence of input data. The single pass sort allows variable record length from one to 256 bytes.

The program costs \$100 and can be ordered through Gregoire Associates, at Robin Hood Drive, 03060.

Cosmic Offers 'Nastran'

Engineers Benefit From Nasa Effort

By Don Leavitt
Of the CW Staff

ATHENS, Ga. — More than 70 firms, universities, laboratories and government agencies are reaping the benefits of work done for the space program by using Nastran, a program developed by the National Aeronautics and Space Administration, to solve their structural engineering problems.

Nasa's Structural Analysis (Nastran) program cost more than \$3 million in original development, and the Langley Research Center spends about \$400,000 annually for updating and application. Yet the complete set of program tapes and documentation including updates can be purchased through Cosmic for an average \$1,700.

185 Applications

Designed to analyze the behavior of elastic structures under a very wide range of loading conditions, the program is now being used in more than 185 different applications, ranging from suspension units and steering linkages on automobiles to the design of power plants and skyscrapers.

Nastran first became publicly available in late 1970 and is now "considered virtually indispensable" by many engineers, according to Cosmic. Two thirds of the projects in which it has been applied would not have been attempted without it, Cosmic claimed.

The problems that can be solved by Nastran fall into four general classes: static structural, elastic stability, dynamic structural and general matrix problems. An Executive System within the program organizes the sequence of "functional modules" which perform the appropriate mathematical computations.

Solution results may be plotted on any of three general types of plotters: table,

microfilm or incremental.

Program and documentation purchase options include source deck images, object deck images, executable program, a file of a separate program to link the object decks and a file of demonstration problems and solutions.

More information is available from Cosmic, 112 Barrows Hall, University of Georgia, 30601.

Utilization Can Increase 50% By Computer Capacity Analysis

SANTA CLARA, Calif. — Three quarters of the processors studied under Computer Capacity Analysis (CCA) operate at less than 30% of capacity, according to Computer Synectics Inc., which provides the measurement and evaluation service. With proper reorganization and balancing of resources, most users can achieve 85% or better utilization, the company claimed.

The effectiveness of CCA is attributed to the combined use of hardware and software monitors and to the technicians from Computer Synectics who interpret the results of the monitored runs, the firm said. CCA also is said to be performed on any CPU.

The study starts with an on-site survey to gather information about the user's

installation and organization. A detailed plan of measurements to be made, tools to be used and times for the test runs are submitted by the analyst.

Computer Synectics personnel install the SUM hardware monitor, and prepare the control card statements for any software monitors used in the testing phase. Functionally, the monitors are transparent to the user's operating personnel.

Simulation techniques can also be used to study alternative CPU configurations, peripherals and workloads.

The output of the monitor and simulation runs is annotated by the Computer Synectics technician to aid the user in his understanding of the situations shown.

These outputs also provide the basis of the technician's final report which generally includes specific recommendations for improved system performance. Recommendations will often cover equipment, programs and manpower, the company noted.

The length and complexity of the evaluation determines the cost of CCA for the individual user.

Computer Synectics Inc. is at 328 Martin Ave., 95050.

'Paymaster' Sits Behind Tables

WHEATON, Ill. — A table-driven generalized payroll system that can be updated without reprogramming, Paymaster, from Generated Systems Inc. (GSI), can be used in 65K bytes of core under DOS/360.

Table and processing information is stored in a series of random access control files. Employee information is organized under a "segment" concept, supporting variable length records which can be extended or truncated to reflect current status.

999 Types of Earnings

With that approach, the system can handle 999 types of earnings, 999 types of deductions and 999 types of taxes for each employee, if such extremes are ever needed, GSI said.

Having multiple rates possible by employee, the system can selectively "chain" earnings to accumulate the total amount due based on a single input. In addition, earnings can be selectively sheltered from tax calculations.

The user can override normal tax calculations or deduction specifications on a one-time or blanket basis, the company said.

Optional features are said to include personnel information reporting and a labor distribution accounting system.

Paymaster is a set of Cobol programs that run under DOS or OS. The base system costs \$20,000.

GSI is at 108 W. Liberty Drive, 60187.

Materials Managed by Library

PALO ALTO, Calif. — Complete manufacturing materials control, planning and management systems, tailored to user needs without massive customization costs, can be generated by Executive Technology Corp. (ETC) through its library of function modules.

The modules can cover all functions normally performed by manufacturing organizations in the materials management area. The library provides support in three distinct but related areas, from reporting of current conditions, through planning based on known facts, to simulating of future changes.

A typical implementation covering all three areas is expected to fit in 128K bytes under DOS, ETC said.

The control area provides the current status of material and includes on-hand, on-order allocation, shortage and value information. This is vital as a base for the effective use of the planning and management functions, a spokesman stressed.

Planning modules should permit the scheduling of material requirements in details for two years. The management functions allow development of corporate goals and forecasting of results of alternative courses of action.

A "starter set" of ETC modules, including inventory control, cycle auditing, parts history and product definitions, is available for \$500/mo or \$18,000 for purchase.

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Service Translates Autocoder to PL/1

NEW YORK — Totaltran, an Autocoder-to-PL/1 service under which the vendor guarantees to translate 90%, and claims to convert an average of 95%, of a clean source program overnight, is now available from CPU Management Advisory Corp.

At the same time, the firm has a 1400 Series "decompiler" service with which clean Autocoder source code is generated from users' object decks.

Programming Load Eased

Used together, the services provide a quick change from compatibility to native mode processing on IBM 360/370 equipment, without heavy demands on the user's programming staff.

By itself, the decompiler lets the user review program logic in source language, even though it may have been patched heavily since its last assembly, a spokesman noted.

Under one option, the company will sell the untouched output of its translator along with a user's guide to bring the output to an operational status. No charge is made if less than 90% of the Autocoder source is translated into the third-generation language.

Under another option, the company does the

cleanup needed to complete the translation, and tests the "new" program with user-provided test data before delivering it.

The price of the untouched translation service varies with the percent of successful translation, and costs from \$150/program to \$250. When the company does the entire translation and testing, the cost is \$1.25/source card.

The company is at 853 Broadway, 10003.

Singer 10 Users Get Accounting Systems

DALLAS — Singer System 10 users in wholesale distribution and light manufacturing can integrate most of their applications with the System Ten Accounting and Reporting System (Stars) package from Information Management Associates Inc. (IMA).

The system includes logic for invoicing, accounts receivable, inventory and sales analysis, as well as payroll, accounts payable and general ledger processing. Each application is customized before delivery, IMA said.

Designed Around Model 70

The Stars applications are designed around the interactive capability of the Singer Model 70 Workstation, which effectively leads the user through all the required steps. Operators can display records, field by field, making changes where necessary, without elaborate transaction code processing commonly used in batch-oriented systems.

The direct entry of data also avoids any need for keypunching, batching and balancing of items before they go into the computer. The training of operators for the Workstation is much simpler than that needed for coding clerks or key-punch operators, the company claimed.

The operator's unit also permits posting of cash or adjustments directly onto ledger cards at the same time the data is put onto the System 10 file, so that users can get hard-copy documentation on a current basis.

Functionally, each Stars application utilizes one of the hardwired memory partitions on the System 10, communicating to its peripherals through the appropriate interface, and to the other applications through the common storage area.

Stars implementations, including some customization and full support, will cost about \$10,000, but IMA said it would provide the source code on tape and documentation for \$6,500.

IMA is in the Life Building at 311 S. Akard St., 75202.

Coming in the June 28 issue of *Computerworld* is
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Software and Measurement

In this supplement our editors will examine the current state of the software field including:

- Improving CPU productivity through efficiency measurement packages
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This supplement is must reading for computer users and must advertising for software marketers.

Closing is June 9. Contact your *Computerworld* representative soon, as ad space is limited. For details call Dottie Travis or Dawn Silva at *Computerworld*: (617) 332-5606.

Activity Reporting Aids Social Agency

DECATUR, Ill. — A management information system to ease the administration of a statewide mental health service program may aid a wide range of social service organizations. Developed with state funds, it apparently will be free to qualified agencies.

The Staff Activity System, designed by Region 3B of Illinois's Department of Mental Health, helps the administrator capture and evaluate data on patients, staff workers and their interactions. Coded entries on the input sheet can be adapted to almost any range of staff activities or staff position, a department spokesman noted.

The system is "self-adjusting" and produces reports tailored to the input. The formatting logic readjusts print positions, without operator intervention, so that data is spaced evenly, regardless of how many columns are used.

The software is written in Fortran IV for use on various CPUs. The present version runs in 4K bytes on an IBM 1130. More information is available from the Region 3B Director, Adolf Meyer Center, East Mound Road, 62526.



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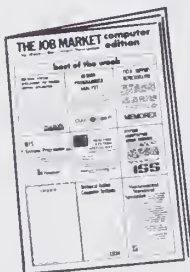
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Former FCC Head Houser Says

Interconnection of Non-Bell Equipment Aids System

By Ronald A. Frank
Of the CW Staff

CHICAGO — The interconnection of customer-provided equipment to the telephone network has "expanded the utility and value" of the Bell System, former FCC Commissioner Thomas Houser told more than 100 data users at the Data Communications — '72 Conference sponsored by the Chicago Industrial Communications Association (Cica).

Bell's powerful base of monopoly revenues could be used to stifle or control competition from the new specialized common carriers, but, Houser added, regulatory restraint and antitrust and fair trade laws will probably be used to assure a fair competitive environment for users.

Fault Isolation Session

The Cica conference included several user-oriented workshops and case studies including a session on fault isolation by Robert E. Bump, teleprocessing specialist at Standard Oil Co. of Indiana.

Dealing primarily with the isolation of transmission problems on private line systems, Bump said that Bell can help pin down system problems with some of its special offerings.

Company Proposes To Test Equipment For Certification

SALT LAKE CITY, Utah — While regulatory agencies talk about certifying non-carrier data equipment, one company is already establishing an unofficial certification capability.

The Communication Certification Laboratory (CCL) has proposed to the Federal Communications Commission and various state commissions that it be allowed to certify interconnection equipment.

To oversee the operation CCL would establish an advisory board to monitor certification procedures and resolve any problems. In addition to taking part in regulatory problems dealing with the certification of equipment, CCL would perform the actual testing to determine that a particular device meets the required standards.

Certify User Modem

"There would be a fee of about \$500 to come under our certification contract," says Calvin Jackson, vice-president of CCL. While CCL feels that equipment certification of independent equipment should be done by the manufacturers, Jackson says his firm would also certify an individual modem for a data user. "To have a modem certified, a user would ship us the plans and drawings and we would have to evaluate how long the procedure will take," he said.

Although he would not estimate the cost of such a certification, one observer said the modem certification could cost about \$2,500, and the procedure would take about 20 to 30 days.

While CCL has formulated detailed plans to implement certification standards, regulatory experts are skeptical. They point out that neither the FCC or other agencies have settled on the certification of customer-provided equipment.

One FCC staff spokesman described the CCL certification plans as "self-generated," implying that they do not yet have any official status.

The certification of customer-provided data equipment by a firm such as CCL may enable users to tie their independent devices to the phone network. But a ruling by the FCC and probably the state commissions would be required before the program could take effect. Such a ruling could eliminate connecting arrangements like the Bell DAAs from users' sites.

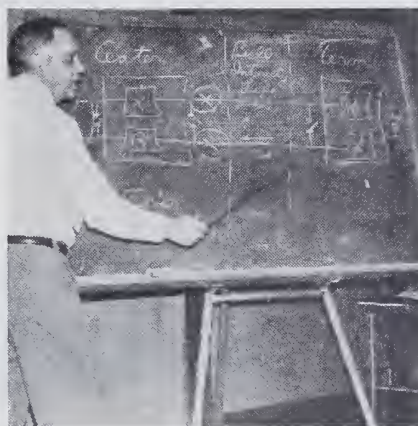
On four-wire systems, many Bell companies will provide a manual switch at the user's premises to "loop around" the line, thereby isolating data sets from the system. This provides users with a simple

Communications

means to determine whether problems are caused by the line or by the equipment, Bump said.

When Bell modems are installed, the user should request that each data set be wired via a plug/jack arrangement, Bump suggested. This makes it easy for the user to switch data sets when an equipment problem is suspected. Spare modems are kept available at the Standard Oil site for backup, Bump said.

To monitor the condition of continuously used leased lines, Bump said the phone company will install a high-gain



(CW Photo by R.A. Frank)
Robert Bump, teleprocessing specialist at Standard Oil of Indiana, explains his methods of fault isolation. amplifier and a peaker, connected via a monitor jack. This allows the user to

listen for the carrier tone when line problems are suspected, he said. When no tone is heard, a line problem is indicated.

At a workshop on the selection of data terminals, Ed Bonkowski of Sears Roebuck said there is a tendency for users "to decentralize the input function" via the use of intelligent terminals. There is still a large gap between low-speed terminals operating at teletypewriter speeds and the faster intelligent terminals, Bonkowski said. Users would like to see more equipment in the 120 char./sec range since there is a real scarcity of these devices, he claimed.

Robert Shaw, communications manager at Allstate Insurance, told users his firm replaced Bell 201 data sets with Milgo modems. In addition, Allstate changed from C2 conditioned lines to non-conditioned 3002 voice-grade lines. The result was better quality transmissions and a significant yearly cost savings, Shaw said.



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Bits & Pieces

Conograph Graphic System Usable on Closed Circuit

WOBURN, Mass. — The Conograph-12 Graphic Display System from Conographic Corp. uses a video monitor for image display and is compatible with closed-circuit TV signals.

The fully interactive device lets the user selectively erase and update a line, curve segment or character at any place on the screen. A zoom allows the user to magnify any portion of the image up to 10 times its size.

The Conograph-12 costs \$10,900 and is available on a 60-day delivery from 6 Gill St., 01801.

Ultimacc Business System Offers 2314-Type Disk Drives

MAYWOOD, N.J. — A minicomputer-based, preprogrammed business accounting system from Ultimacc Systems Inc., the Ultimacc Super-Disk is equipped with an IBM-compatible disk controller.

The controller can handle from one to four 2314-type disk drives. The expandable disk drive feature gives the system a potential maximum storage capacity of 116 million 8-bit characters.

Ultimacc Systems Inc. is at 9 Brook Avenue, 07607.

Memory Boosts PDP-8 Storage

FAIRFIELD, N.J. — Memory expansion is available for the 12-bit PDP-8L minicomputer from Digital Computer Controls.

The add-on memory can be purchased in increments of 4K and is fully compatible with the PDP-8L computer. Priced at \$3,500 for the first 4K, each additional 4K is \$2,375. Prices include field installation, on-site testing and a 90-day warranty. Delivery is 90 days and service contracts are available from 12 Industrial Road, 07006.

Smaller Bits

Kysettes, digital tape cassettes from Kybe Corp., Waltham, Mass., are certified twice — before and after the tape is loaded into the cartridge. Kysettes are priced at \$6 in lots of 100.

Elsytec, Inc., Syosset, N.Y., has announced a stand-alone Hardware Fast Fourier Transform Processor (model 30s HFFT) for \$24,000 including a 4K Nova 800.

The Model III Disk Cartridge from Scopus Corp., Lowell, Mass., is guaranteed compatible with the IBM System 3 and to initialize error-free.

The Data Entry Terminal from Applied Information Industries, Moorestown, N.J., includes a portable entry unit with numeric display and keyboard, transmitter and receiver. It is priced from \$1,220.

Gakken Corp. of America, Irvine, Calif., has developed the low-cost GMR-230 Microfiche Reader that accepts all flat film up to 7-3/8 in. by 4-1/4 in., jacketed film and aperture cards and offers magnifications of 24X, 30X, 42X or 48X.

Three new ribbons, including one for OCR work on all impact printers, and one each for OCR and extra sharp printing for use with its own printers have been announced by Data Devices, a Tarzana, Calif.-based subsidiary of Data Products Corp.

IBM Terminal Resembles 360/20

By Frank Piasta
Of the CW Staff

WHITE PLAINS, N.Y. — IBM is offering users what appears to be a drastically stripped down 360/20 for use as a remote batch communications terminal.

The IBM 2922 programmable terminal seems intended for the 2780 user who wants the advantages of faster peripherals without stepping up to a full 360/20, which would cost at least \$500/mo more.

Based largely on reconditioned major components, according to IBM, the 2922 includes as standard equipment an 8K byte 3.6 μ sec processor that is

360/20-compatible, a 500 line/min chain printer similar to the 1403 Model 2 and a 500 card/min reader that resembles the 2501 Model B1.

Communications are handled over telephone lines using binary synchronous transmission at data rates up to 7,200 bit/sec.

Programs for the 2922 will have to be compiled/assembled on a 360/20 because of the terminal's lack of peripherals. It is designed to operate under OS or DOS Btam, OS Tcam or Hasp.

The printer has a non-interchangeable chain cartridge using the PL-1 character set of 60 graphics. It uses

paper from 3-1/2 in. to 18-3/4 in. wide. Print line is 132 characters.

The card reader can handle only 80-column cards and is equipped with a 1,200 card hopper and a 1,300 card stacker.

The 2152 console keyboard adapter, which includes a Selectric I/O typewriter is optional. The only other option is Ebcidic and Ascii test transparency, IBM said.

Lease price of the 2922 under the standard IBM contract is \$1634/mo. It can be purchased for \$43,525. The console keyboard is priced at \$87/mo or \$2,650. Text transparency will add \$20/mo to the lease price or \$490 to the purchase price.

Based on New Mini

HIS Systems Stress Communications

WALTHAM, Mass. — A series of six systems for communications and control applications was announced this week by Honeywell Information Systems.

The systems are all based on a new 16-bit minicomputer, the 716, with higher speed and improved software support.

Included are the Series 700 Terminal System, the Multipurpose System, the Batch Processing System, two Sensor-Based Systems, Remote Line Concentrator and Remote Message concentrator.

The 716 central processor is a single address, "two's complement," parallel 16-bit binary machine. Memory cycle time is 775 nsec/16-bit word.

Core memory and read-only memory (ROM) are available. Core is expandable in 4K modules to 32K words. ROM is a configurable semiconductor memory in 256-, 512-, 1K- and 2K-word sizes.

Processor registers available to the programmer feature two arithmetic, one program sequence and two index registers, one of which can be used as a hardware stack register. Direct, indirect and indexed addressing of memory is provided. Memory is divided into 512-word sectors, and the currently executing sector can be directly addressed in the given execution time.

All memory can be addressed indirectly

or through an index. Stack and general register addressing are also provided.

Other features include control panel with lock, operator's halt register, a 16.6 msec real-time clock, power failure interrupt, automatic restart, trace interrupt and stack overflow/underflow interrupt.

High-speed arithmetic, priority interrupt, memory lockout, base sector relocation, memory parity and real-time clock and timer are optional.

The Series 700 Terminal System is intended for applications requiring data collection via terminals, interactive terminal computer communications and limited data processing. It provides facilities for the attachment of up to eight teletypewriters, paper tape I/O, two tape units and up to two synchronous single-line controllers or a medium-speed controller capable of handling 16 synchronous/asynchronous lines.

The Series 700 Multipurpose System is designed for program development, data processing, communications with terminals and other computers and real-time data collection. The system can be equipped with up to four tape drives, card reader and punch, line printer, paper tape equipment, teletypewriter, medium/high-speed single-line controllers, 32K- to 256K-word fixed head disk and a .9M- to 30M-word removable disk.

The Series 700 Batch Processing System is meant for batch processing and program development via a disk subsystem. It can include four tape drives, card reader, line printer, teletypewriter and up to 30M words of removable disk storage.

The Series 700 Sensor-Based Systems are suited to applications in process and manufacturing control, and industrial and medical lab automation. Basic systems can be expanded with peripheral devices, CPU features and analog and digital I/O modules.

The Series 700 Remote Line Concentrator, a comprehensive digital computer-based Communications System, includes a synchronous single-line controller, low-speed or universal multi-line controller and a teletypewriter in its basic configuration.

The Series 700 Remote Message Concentrator is intended to interface a large number of low-speed asynchronous lines to one or more high-speed synchronous lines. It can concentrate up to 128 300 bit/sec full-duplex lines, or 64 2,400 bit/sec full-duplex lines onto an appropriate high-speed line. It includes a synchronous single-line controller, low-speed or universal multiline controller and teletypewriter.

Prices and delivery schedules are presently unavailable.

Ampex Add-On Core Memory Saves 370 Users up to 30%

MARINA del REY, Calif. — Ampex Corp. has introduced a core memory to expand mainframe storage of IBM 370/155, 165 computers.

The Ampex ARM-3360 replacement core memory provides 370 users with high performance and savings up to 30%, according to Eugene E. Prince, vice-president and general manager of the Ampex Computer Products Division. The ARM-3360 is available in 512K-byte modules to enlarge 155 and 165 systems to capacities of 2M and 3M bytes respectively.

The ARM-3360 operates with a 2 μ sec cycle time identical to IBM mainframe storage. There are no software or hardware modifications required, Prince said. Delivery is about 30 days.

The core memory technology used in the ARM-3360 is claimed by Ampex to have superior reliability when compared with other technologies, including the bipolar and MOS memories produced by other companies.

The Ampex memory costs under \$225,000/module or may be leased for under \$5,000/mo on a two-year contract including 24-hour-a-day maintenance. IBM purchase and lease prices are \$264,000 and \$6,000 respectively, although IBM overtime use charges may add up to 10% to monthly operating cost, Prince pointed out. Ampex equipment is available for unlimited use without additional charges, he added.

Each ARM-3360 module includes a maintenance control panel for independent self testing. A spare memory unit is also provided with each system to keep downtime to an absolute minimum, Ampex said.

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Disk System Uses Universal Controller To Offer Random Access for Any CPU

CHERRY HILL, N.J. — Peripherals General, Inc. has coupled its Universal Controller [CW, April 19] with single- and double-density disk drives to offer users random-access storage for any computer. Both single- and double-track drives are available.

In contrast to most plug-to-plug systems which are limited to the IBM 360/370 the Peripherals General systems can be programmed to suit the needs of any CPU, the firm said.

The 741 drive has a capacity of 29.4 Mbyte/drive, the 742 58.8 Mbyte/drive, and the 743 has 100 Mbytes. A standard 2316-type pack is used.

The 844 controller can handle up to nine spindles and can include any mixture of drives.

The 741 is an exact replacement for the IBM 2314 disk drive and is mounted two to a rack; 200 data track/spindle are provided with three spares. The 742 is equivalent to two 2314s with 400 data tracks and six spares.

The drives are upward-compatible, with data written on the single-density 741 drives readable on the double-density 742 units.

The 743 offers 400 data tracks recorded at

double density to equal the storage capacity of four 2314s.

Maximum Size

Maximum system size for the three drive models is 233M bytes for the 741 eight-drive system, 466M bytes for the 742 and 800M bytes for the 743.

Data transfer rate is 312,500 byte/sec with the 741 and 742, and 625K byte/sec for the 743. Average access time is 29 msec. Disk speed is 2,400 rpm, equal to that of the 2314, giving an average latency time of 12.5 msec.

Systems are available in any configuration of one or more of any of the three drives, plus controller, to a maximum of nine drives.

No Software Changes

The models 741 and 742 disk drives and 844 controller are intended as direct replacements for the 2314. No operational software changes are required, the company said.

According to prices released by Peripherals General, a five-spindle 2314-equivalent 741 system



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Peripherals General 844 Disk System is 2314-compatible.

with controller would cost \$2,600/mo; a nine-spindle system will lease for \$3,710/mo. Concessions in the prices will depend on such factors as the length of the lease and the number of systems ordered, the company said. Delivery is 30 to 90 days from Cherry Hill Industrial Park, 08034.

SEL Announces Systems 71, All-Core Version of S/72

FORT LAUDERDALE, Fla. — Systems Engineering Laboratories, Inc. (SEL) has announced the Systems 71 16-bit mini-computer, an all-core memory version of the company's Systems 72.

The Systems 71 is compatible with the Systems 72's line of front-end equipment, standard peripherals and software. Systems 71 prices will range from approximately \$15,000 to \$150,000. First deliveries are scheduled for August from 6901 Sunrise Blvd., 33313.

Systems Include Sonic Digitizer

SOUTHPORT, Conn. — Two systems for interaction between graphic displays and computers have been developed by Science Accessories Corp. (SAC).

Both systems use a Science Accessories graf/pen sonic digitizer and a Tektronix Model 611 memory scope.

In System 2005, the graf/pen is used to convert graphic information into digital X and Y coordinates.

In System 2006, the graf/pen sensors are mounted directly on the face of the scope so that the graf/pen can be used to directly provide digital coordinates.

The SAC System 2005 and System 2006 are priced at \$7,175 each. Delivery is about six weeks from 65 Station St.

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Library Systems—Part I

The Challenge Is for National Programs

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. — The costs of library systems and dissatisfaction with their performance continue to rise, but computer-based information systems may solve the problem, according to a report from the Computer Sciences and Engineering Board here.

The primary bar to the development of national computer-based library and information systems is not the present state of the technology, but rather a combination of "complex institutional and organizational human-related problems," the board (part of the National Academy of Sciences), claims.

The report, called *Libraries and Information Technology: A National System Challenge*, urges that U.S. science policy be directed to "welding the present fragmentary efforts into coherent national programs" in this area.

'Serious Challenge'

Presently, the report states, "the engineering community faces a serious challenge to provide

tools, techniques and systems for the solution of some very difficult and important problems.

"While the potential of computers for handling information has long been recognized, the achievements over the last several years seem to be less than desired.

"Systems are slow in development, expensive in operation, less capable than desired and generally insufficient to fully satisfy the national needs that have been identified."

The country's library systems are a "vital national resource" but they face the task of "making recorded knowledge more readily available for the benefit of society," the report states.

Today, it continues, "new and powerful technology exists to be used, but the basic mechanisms for exploiting recorded human knowledge remain mostly unchanged."

Means Inadequate

Information that results from scientific and technical work has a high value in our technological society, the study asserts, but the means for handling it are inadequate.

The fact that most previous studies have concentrated on scientific information, however, "should not blind us to the broader opportunities presented by modern technology," the report says.

Modern computer technology, coupled with concerted national action, "offers the opportunity for developing adequate means" to handle such information effectively.

"Computers," the report states, "are key elements of this technology because they provide the logical control mechanism to select alternative actions based on predefined selection conditions and on various characteristics of the information being handled."

A computer-based national information system must perform certain essential functions, according to the study, including:

- Selection: processes for choosing what should be obtained and stored.
- Storage: processes for appropriately organizing the information to be stored, for storing the information, and for maintaining and managing the storehouses.
- Access: processes for identifying and finding desired information.
- Distribution: processes for transferring information from producer to storehouse, among storehouses and from storehouses to users.
- Control: processes for orchestrating the selection, storage, access and distribution functions.

"Computer processes can support the selection and control functions. Evolving computer technology offers capability for the production and storage both of catalogs or indexes and of the primary records to aid the access function. Electrical telecommunications offer alternatives for providing machine support to all types of operations and to physical transport in the distribution functions," the report notes.

CAI Supplements Dental Training

LEXINGTON, Ky. — As part of a program to speed dental students at the University of Kentucky through their studies, four courses now utilize computer-assisted instruction (CAI).

Oral pathology is taught entirely by CAI, with all third-year oral pathology students receiving facts and questions from an on-line terminal with a slide viewer alongside. Dental practice environment, oral anatomy and endodontic technique also have CAI segments ranging from a review of anatomy to 16 problem situations involving simulated patients.

The student signs on with his assigned computer number and begins the program he has chosen. The computer states information about a patient or dental problem and then asks the student a question.

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EDOS is 100% compatible with DOS. All IBM distributed programs and all user written programs will operate under EDOS without modification. No modification to the programs, job control language, or data files is required. Programs do not need to be recompiled. Problem programs can be run under the control of EDOS and then be immediately run under DOS control, if you desire. EDOS benefits are universal, from the 32K DOS system to the larger users who may be considering a DOS to OS conversion. EDOS is extremely easy to install since no changes are required to your current operation.

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EDOS is performance. The primary purpose of EDOS is to improve the throughput of your current system. This is accomplished by providing:

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2. An improved operating environment for your system operators.
3. Enhanced functional characteristics of existing features.

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EDOS is inexpensive. With all of the features and performance that EDOS provides, its compatibility and ease of installation, we believe you will want to evaluate it in your own installation. We frankly believe you will agree that EDOS is the most exciting systems software available. A 60 day free evaluation period is provided. The basic System Release 4 of EDOS (all features except six partition support) has a lease price of \$225.00 per month. The full System Release 4 of EDOS (including six partition support) has a lease price of \$300.00 per month.



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Because of 'Automatic Procedures'

Computer's a Natural Poet, Composer...

By a CW Staff Writer

CAMBRIDGE, Mass. — The fine arts field is especially ripe for the development of computer applications because of the tendency (or is it necessity?) of both artists and computers to respond automatically to given tasks.

Dr. Bradford Dunham, a research staff member at IBM's Thomas J. Watson Research Center, told a Harvard University lecture on "Computer Science and Its Applications" that most areas of

the arts include these automatic procedures that could eventually be performed by a computer.

Dunham appeared as part of the Distinguished Lecture Series sponsored by the Harvard Center for Research in Computer Technology.

He told of a group of persons totally unschooled in the techniques of formal poetry who managed to create pure oral epic verse. How they acquired this automatic capacity was not known but the fundamental techniques were deeply ingrained.

"Computation," Dunham continued, requires automatic procedures which can be applied by the computer in the process of creation.

More Interaction

The degree of interaction required between the machine and the variables encountered in such future systems will exceed that required in the present state of the art, Dunham stated.

Previous lectures in the series covered such topics as problem solving, computational peak finding, computational theorem testing, computer history, the intuitive and the formal pattern recognition, logical packages and modularity and computational complexity.

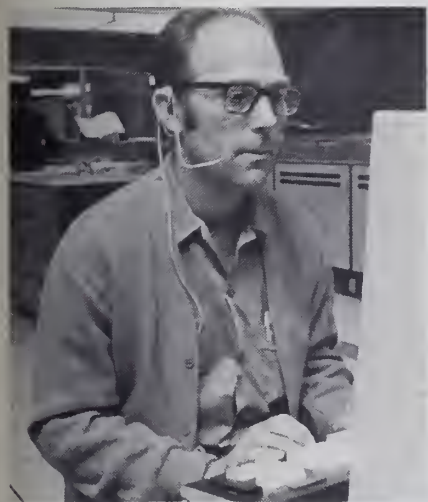
Getting a Cab Getting A Little Easier in L.A.

LOS ANGELES — The Yellow Cab Co. of Los Angeles has turned to computers to improve taxi operations in the sprawling Los Angeles area.

Computat is providing faster and more reliable service by quickly and accurately matching telephone cab requests with the nearest available taxis.

The system is built around two NCR Century 100 computers linked to eight NCR 795 CRT terminals. The system can handle up to 10,000 calls a day for the 700 cabs operated by the company.

Yellow Cab operators take telephone orders and enter these into one computer through the terminal. The computer determines in which of the city's 200 numbered grid areas the callers are located and then matches the orders with the nearest available cabs, displaying the information on the screen of the dispatcher



Los Angeles taxi dispatcher receives information relayed by computer and radios to most strategically located taxi to pick up fare.

who then relays the order to the appropriate taxi driver via radio.

Stored for Later Use

Logs of incoming calls, the dispatching of cabs and the times and places of pickups and deliveries are stored for later reference.

According to George J. Corsello, chairman and president of Yellow Cab of Los Angeles, the area covered by his firm consists of more than 400 square miles, the largest of any major cab company in the world.

Computer Monitors Pollution

SEATTLE, Wash. — The Puget Sound Air Pollution Control agency here is using an automated system to monitor the loading of air contaminants into the atmosphere.

Ten air-monitoring stations throughout the state feed air-quality data into a computer, which then figures contaminant averages over several time periods. The agency uses these figures to make daily reports, which are single numbers, based on a scale of zero to 150.

This scale is also tied to a federally required air-pollution-episode-avoidance plan. The plan calls for different measures to be taken should air pollution reach undesirable levels. For example, if the agency's report hits 50, this is the "alert" stage, and the agency is authorized to ask for reductions in sulfur dioxide emission.

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CI Notes

Univac Sells 18 RCA Series

BLUE BELL, Pa. — Univac has shipped and installed 18 Series 70 (formerly the RCA series) computers valued at over \$14 million in the 100 days since it took over the RCA customer base.

Ten of the systems were added to existing installations, while the other eight were upgrades replacing less powerful RCA computer systems, according to John C. Butler, vice-president and general manager of Series 70 operations.

"Univac is committed to providing complete and continuing hardware and software support to the Series 70 customer base. We believe that this large shipment of the equipment to users during the first 100 days of Univac's Series 70 activity dramatizes and substantiates this commitment," he said.

Victor Plans POS System

CHICAGO — Victor Comptometer plans to introduce a point-of-sale system to be manufactured by Hugin in Sweden. Designed for the small retailer, the system will include a sales register with tape cassette unit.

The firm previously announced the 800 intelligent terminal supplied by Nixdorf in Germany and marketed in the U.S. by Victor.

Used 30s Firm in Price

ELMSFORD, N.Y. — Prices for used IBM 360/30s firmed during the first quarter of 1972, according to Joseph W. Kirby, vice-president of the TBI Equipment Division.

"The supply of used 360/30s has been fairly good during the last three months, but demand has been even better, forcing the going price up several percentage points. We think the improvement in demand has been due to the increased strength of the economy, and to the growing awareness on the part of DP users that the price/performance ratio of a used 360/30 is very advantageous."

Supershorts

California Computer Products Inc. announced that the contract under which Century Data Systems Inc. (a Calcomp subsidiary) was to supply disk memory systems to the Telex Corp. is canceled.

Facit-Odhner, Inc. has created a nationwide network of OEM service centers for the maintenance of its input/output typewriters.

A group of companies has banded together to form a national trade association for the interconnect industry, according to Jason S. Schloss, executive director of the new Interconnect Association (NIA). The group will be headquartered at 2728 Colonial Avenue, Roanoke, Va. -30-

The Air Force has accepted its first Planar Coax packaged computer, delivered by Bunker Ramo Corp. under an advance development project.

ISC/Pryor Computer has been named distributor for the Caelus CM III Disk Cartridge manufactured by Electronic Memories & Magnetics Corp.

IBM to Stay 'Lean and Fast Moving'

By Molly Upton
Of the CW Staff

DALLAS — "IBM has been trimming down to its best playing weight. . . We will have to stay lean and fast moving to attain our goal of being the best service organization in the world," observed IBM Chairman T. Vincent Learson, presiding over his first stockholder meeting.

Through attrition, IBM employs 12,000 fewer people than it did two years ago, and has retrained and reassigned many employees to better serve its customers, he claimed.

In an encapsulated view of 1971, President Frank T. Cary said as of March 31 IBM has shipped more than two thousand 370s since deliveries began in February 1971. In the first 15 months of 370 shipments, IBM topped the first 20 months of installations of 360s, he noted.

The figures indicate that in the first quarter of this year, the firm shipped more than 650 of the new computers, or about half as many as the 1,350 shipped during all of 1971.

Over 10,000 System 3s

Over 10,000 System 3s have been shipped since January 1970, Cary said, describing it as "rapidly becoming the most popular single system IBM has ever produced."

In line with increased emphasis on marketing by industry, about 2,000 employees formerly in engineering and technical phases of production are now adding their skills to the marketing force, Cary said.

The DP market is changing, Cary said, noting the new marketing emphasis is a reflection of the fact that DP is being used efficiently for record keeping and users now want to apply their computer capabilities to other specific applications.

Last year, over 125 programs were announced, to further extend "the traditional partnership between IBM and the user."

The two especially bright spots in the



(CW Photos by M. Upton)

Thomas Watson sits back and takes it easy as Frank Cary and T. Vincent Learson run the meeting.

corporate economy were performances from the Office Products Division and World Trade Corp., Cary observed. Office Products scored its best year ever, with strength both here and abroad, and World Trade contributed over one half of 1971 earnings, he said. As an indication of growth, 1971 World Trade earnings were greater than those of IBM as a whole only eight years ago, he added.

Learson strongly denounced any trend toward protectionism as an attempt to in-

crease domestic employment. What is needed is a return of consumer confidence and spending, he said.

"We also need to increase the rate of investment in U.S. plants and equipment," Learson stated. "And we need to put greater emphasis on the development of technology that will help us to move ahead in productivity and to compete more effectively in world markets."

"Finally, we need a greater effort by

(Continued on Page 29)

Studies Show Plant Automation Market Quadrupling by 1980

NEW YORK — The market for factory automation equipment will grow to over \$4 billion by 1980, two research firms agreed recently.

The market is presently pegged at around \$1 billion today, and will double by 1975 and double again by 1980, Frost

and Sullivan and Quantum Science Corp. predicted.

While the overall computer industry will grow at a rate of about 13% a year during the next 10 years, the Quantum report points out that the use of computers in manufacturing and assembly will grow at twice this rate. In addition, sales will be in all types of computers — minis, midis and maxis.

The report explains that minicomputers will be used at the operating level, which will feed a central midicomputer which controls the factory floor. The midicomputer, in turn, will feed the firm's main computer to provide management with improved control.

The dramatic growth in the area is "partly the result of widespread acceptance of modern control technology by the discrete parts manufacturing industries," according to Frost and Sullivan.

"Also anticipated over the next 10 years," the firm said, "is the growth, by an annual rate of 7% to 8%, of plant and equipment expenditures by discrete parts manufacturers." (The industry currently contributes \$100 billion to the GNP and employs 7-1/2 million people in 28,000 plants.)

Chief among the factors for the growth in factory automation equipment market are:

- The crucial need to significantly increase U.S. productivity.
- The availability of required automation technology to achieve productivity upgrading now exists at costs within reach of even the smallest factories.
- The anticipated adoption of a meaningful (7% to 10%) investment tax credit — possibly in combination with increasingly liberal depreciation allowances — should serve to provide an immediate boost to the growth of the automation market.

End-User Memory Marketing Area Realigned With Two Agreements

MINNEAPOLIS — There has been a realignment in the end-user memory marketing area, with Control Data marketing

Fabritek units and Computer Investors Group (CIG) marketing Data Products units.

CDC Unit Concerned With Social Role

MINNEAPOLIS — Control Data Corp. has established a Committee on Corporate Responsibility to develop and recommend corporate strategies and plans "to achieve the company's social objectives."

The committee will be the focal point for communication with the public on social issues, CDC said, and will meet with responsible groups and organizations concerned with the firm's social role.

The committee activities will include such areas as hiring and upgrading of females, minorities and the disadvantaged; inner city and rural poverty plants; day care centers; consumer protection; ecology and environmental protection; educational aid such as research-sponsored grants and Control Data Institute scholarships; and relations with minority enterprises.

Norbert R. Berg, vice-president and senior staff officer for administration and personnel, will be the chairman of the new group.

Under the first agreement, CDC has agreed to buy Fabritek memory expansion units for IBM 360/22, 30, 40, 50 and 65 computer systems. The initial order is valued at around \$1 million.

Manufacturing Rights

The agreement also includes provisions for Fabritek to grant CDC non-exclusive manufacturing rights to the units in the future. CDC will market the units through its end-user marketing peripheral organization that presently sells IBM-compatible disks and controllers.

Under the Data Products-CIG deal, CIG will market the Large Core Store memories of Data Products in the U.S., Canada and Western and Eastern Europe. Data Products will continue to market the units itself.

The agreement, valued at a minimum of \$2.5 million during the coming year, covers memories used with IBM 360/50, 65, 67 and 75 computer systems.

In return, Data Products will have the right to market Data Recall memories to certain customers in the U.S. CIG has the marketing rights to the Data Recall memories.

Ampex Announces Fast OEM Core Memory

MARINA DEL REY, Calif. — A low-cost core memory which stores data faster and more compactly than previous core memories of its type has been developed by Ampex Corp. for computer manufacturers.

Eugene E. Prince, vice president and general manager of the Ampex Computer Products Division, said the Model 1860 Series core memory provides access to

The Ampex memory uses designs with tight herring-bone patterns, Prince said. Its design provides improved price/performance ratios for all types of computers; the 1860's modularity permits simple expansion without costly engineering modification, he added.

The memory uses 18-mil cores in 3-wire, 3-D configurations for maximum reliability and economy, Ampex said. The 8K word model measures 8-in. high by 10-in. deep by 2.2-in. wide.

Microdata Adds Peripherals

SANTA ANA, Calif., — Microdata has added three data storage devices to its line of peripherals for the Micro 800 and Micro 1600 minicomputers. Included are disk storage, magnetic tape and paper tape systems.

The 8955 disk system for the Micro 800 and the 2851 for the Micro 1600 include a disk drive with moving head removable cartridge, with a capacity of 2.4M bytes. Average access time is 75 msec.

The 8956 and 2852, for the Micro 800

and Micro 1600, respectively, include a disk drive with one fixed disk plus one removable cartridge with a capacity of 4.9M bytes and an average access time of 95 msec.

Four tape drives and controllers, two each for the Micro 800 and Micro 1600, offer recording density of 800 bit/in. on half-in. tape in IBM-compatible format.

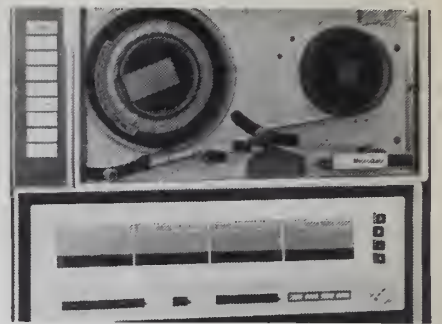
The Model 8960 for the Micro 800 and the 2810 for the Micro 1600 offer 12.5 in./sec tape speed. Transfer rate is 10 Kbyte/sec.

Tape speed of 25 in./sec is offered on the 8961 for the Micro 800 and on the 2811 for the Micro 1600. Transfer rate is 20 Kbyte/sec.

The paper tape system consists of a combination 8-channel reader/punch, interface controller, cables and mounting hardware. It reads tape at up to 300 char./sec and punches up to 75 char./sec.

Other New Products

Electronic Processors, Inc., Englewood, Colo., has announced a magnetic tape



Microdata Tape Unit for 1600

system and a punch/print control for its EPI-118 minicomputer.

A high-speed duplicator for the Signetics Field-Programmable Read-Only Memory is available from Curtis Electro Devices, Mountain View, Calif.

A bipolar monolithic 4-bit latch/decoder display driver with BCD data outputs has been developed by Harris Semiconductor, Melbourne, Fla.

The UIW-101E is a unidirectional write-only bit-by-bit incremental cassette recorder from Memodyne Corp., Newton, Mass., using a clutch drive system.

The Librascope Division of the Singer Co., Glendale, Calif., has added the DJ100 Direct Digital Joystick to its established line of display and position control devices.

A numeric cluster auxiliary keyboard for GE's TerminiNet 300 teleprinter is available from the Data Communication Products Department, Waynesboro, Va.

International Teleprinters Corp., Carlstadt, N.J., has added a reversed tape capability and a load-ready-run cover to its Series 18 and Series 08 tape readers.

New OEM Products

data in 250 nsec, compared with 300 nsec for presently available core memories. The Ampex memory stores more than 1,000 bit/cu in., compared with 250 bit/cu in. with earlier memories, he added.

The modular 1860 costs less than \$.015/bit in quantity and is available in 90 days. It offers a full cycle time of 600 nsec. The 1860 systems can be expanded from 8K to 64K, 18-bit words or up to 32K, 36-bit words.

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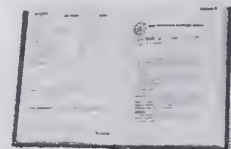
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U.S., Industry Must Train Workers More: Learson

(Continued from Page 27)

both government and industry in training, and retraining workers to bring the availability of skills into better balance with the need for skills," he added.

Studies by the Harvard Business School and the U.S. Department of Commerce show, he said, that the net effect of business by multinational corporations is to improve the opportunity for domestic workers. IBM exports from U.S. plants grew four times in 1971, accounted for one quarter of IBM's overseas markets and supported one out of eight IBM jobs in the U.S., he observed.

On lawsuits, Learson indicated IBM considered the settlements in the Memorex and AMS/Itel suits favorable. The terms of the ITEL settlement "largely vindicated IBM's position with respect to maintenance," he claimed.

IBM has recognized that economic gains are not the sole measure of judgment of success, and is working to contribute to solutions for social and environmental problems, Learson observed.

Although there was little in depth review of the company's prospects, the repartee between Learson and noted stockholder Wilma Soss drew a hearty response. Learson managed to conduct the meeting without having Soss ejected from the room. Last year she was forced to leave the meeting. Although she and Bea-

trice Kelekian dominated the question period, and were frequently heard during other portions of the meeting, Learson was generally conceded to have passed the test of handling Soss and Kelekian with restraint, firmness and occasional humor.

Nicholas Katzenbach, vice-president and general counsel, and former U.S. attorney general, also received some attention from the floor. Noting that he looked "more and more like William Jennings Bryan," Soss asked if he was up for election as director and general counsel or as director.

Soss lost a motion to have stockholders ratify the appointment of Katzenbach as general counsel. She said a counsel "should be an internal watchdog for shareholders."

During the open question period, after some interrogation on the Xerox suit, Soss asked Learson what the corporate legal fees were last year. "That's something I don't dare look at," was the response.

"That's why we want to elect a general counsel, to give you courage," Soss retorted.

"Does it run into the millions?"

"It does."

Francis G. Brown, general secretary of the Philadelphia Society of Friends, noting that IBM was a major supplier of sensors and computers used in the air war in Vietnam, observed that the time has come when the Nuremberg principles of indivi-



Katzenbach fields question.

dual responsibility for actions should apply to corporations.

"It would be anarchy for IBM to refuse to supply the government with equipment it needs," Learson retorted.

Kelekian questioned what the position would be of current stockholders, if IBM were to divide, and whether foreign countries might use Eurodollars to take over IBM overseas subsidiaries. Learson said he did not foresee any such takeover, but indicated the support by foreign governments of DP industries will be significant and that competition in Europe is increasing. "It will be a good battle."

The government antitrust suit is under consideration, Learson advised Soss. In reply to her question, "What does that mean, are they deciding it?" he intoned, "That does not mean anything in particular."

Stockholders elected Donald S. MacNaughton and Harold Brown to the board of directors, re-elected 18 members to one-year terms, expanded the maximum size of the board of directors, amended the retirement plan and ratified the appointment of auditors.



Soss makes a point.



Kelekian discusses meeting.



Members of IBM board of directors.



System 3 exhibit draws attention.

The Economist



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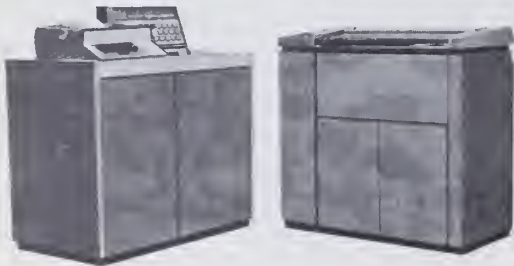
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Intel Offers Flexible Extended Leases, Signs Beckman to First 8-Year Pact

SAN FRANCISCO — Intel is now pushing an extended lease concept and has signed Beckman Instruments to the first eight-year contract.

Under the extended lease plan, the user deals with Intel for all of his computer needs, much the same way he would deal with a mainframe maker, but he gets guaranteed lower rates, Intel said.

Under the Beckman contract, for example, Intel is supplying an IBM 360/65 with 1M bytes of memory from Advanced Memory Systems and all of the tape and disk peripherals (all manufactured by IBM).

Prices Guaranteed

Beckman may add or change units in the system at its discre-

tion at prices that are guaranteed in the basic agreement.

For example, Intel has agreed to supply Beckman with IBM 370 equipment, if Beckman decides to go to the 370, at a guaranteed price. Also, if IBM introduces a new series of equipment before the agreement runs out, Intel will supply that equipment at a lower rate than charged by IBM.

Lower Rates

The most significant part of the agreement, Intel said, is that it commits both Intel and Beckman to do business over the next eight years. The length of the agreement also results in very favorable rates to Beckman—less than 75% of the rental rate charged by IBM for CPU and peripherals and less than 80% of what IBM charges for 370 memory, Intel said.

The agreement also gives Beckman flexibility to change its configuration at any time during the eight-year time and can even upgrade to the 370 without charging the terms of the agreement.

XLO Plans 10M bit Disk

WALLED LAKE, Mich. — XLO Computer Products, formerly known as Bryant Computer Products, has a high-speed, 10M bit head-per-track disk memory designed with 3330-type head technology and 3336-type disks.

Called the XLO 3301 Disk Memory, the unit is modularly designed utilizing 10 basic elements. It features 16 to 128 tracks providing capacities from 1M to 10M bits at a cost of less than .05 cent/bit.

Lifters Prevent Contact

To enhance reliability the XLO 3301 heads are equipped with lifters which prevent contact with the disk surface during starts and stops. Access time is 8.3 msec with data transfer rates varying from 2M- to 5 Mbit/sec.

Standard features of the XLO 3301 include self-contained read, write, select and sector formatting electronics; a belt-

driven disk that provides identical performance at 50 Hz or 60 Hz and write protect on power failures.

The 3301 is designed for systems where fast access and large memory capabilities are required, such as small business computers, process control, communications terminal systems and message switching.

Depending upon quantity and configuration, prices for the XLO 3301 range from \$2,500 to \$5,500. Deliveries are scheduled to begin in June.

Honeywell Gets Federal Approval To Ship Two 615s to Russian Bank

WALTHAM, Mass. — Honeywell has received U.S. Government permission to ship two large 615 computers to the national bank of Russia, Gosbank, in Leningrad.

The 615, announced two years ago, falls between the IBM 360/40 and the 360/50. IBM still has not been allowed to ship a 360/50 to Russia although it received an order for one last year. At least one 360/40 is operating in the Soviet Union.

The \$5 million order with Honeywell includes 100 terminals that will be linked by telephone lines to the computer center from branch offices of the bank within an 180-mile radius of Leningrad.

"We believe," James H. Binger, Honeywell chairman said, "that trade is an important stabilizing influence on world affairs and consequently we welcome this opportunity to cooperate with the Soviet Union."

Contracts

Digital Equipment Corp. has extended its contract with Documentation Inc. for 500 additional card readers to be delivered over the next 18 months. The value of the contract is over \$1 million.

LV Computer Systems, Inc. has received a contract from Reuters Ltd. for the production of an automated stock market action-monitoring service to be known as Reuters Action Ticker. The service is designed to alert subscribers to unusual price movement and volume activity.

Computer Usage Co. has signed a four-year facilities management contract with Montecatini-Edison of Milan, Italy.

Penril Data Communications, Inc. has been awarded a \$780,000 contract by the Internal Revenue Service. Penril will lease, install and maintain 311 Model PDC-4800B-1 modems for 60 months.

Beehive Terminals has received a contract to deliver CRT terminals valued at \$160,000 to Radiation, Inc. for use in satellite communications systems.

The Computer Software Services Unit of First National City Bank has named Applied Logic Corp. as exclusive distributor of its library of time-shared programs.

Greenwich Data Systems has received a four-year contract to operate and maintain the Frontier Airlines computer reservations system and to provide batch DP services.

Univac has received two contracts totaling \$10.4 million from the Naval Ship Systems Command. A \$3.7 million contract includes 11 computers, peripherals, engineering services and data for the Naval Tactical Data System. Under a \$6.7 million contract, Univac will provide 17 AN/UYK-5 computers for the Marine Corps.

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Wisconsin Orders EMR System for Crime Work

MINNEAPOLIS — The Wisconsin Crime Information Bureau has ordered a twin EMR 6135 computer system from EMR Computer to serve as the heart of the Wisconsin Transaction Information for Management of Enforcement (Time) system.

The system, to be installed this September in Madison, will serve as the control center for the state's law enforcement network, which will be linked to the FBI's National Crime Infor-

T1000 computer system, which will be used for the production of news text, display and classified copy.

The University of Saskatchewan has leased an Ampex ECM-50 core memory and a DS-314 disk system for use with its 360/50. The University of Florida, Gainesville, has leased an ECM-65.

Pyramid Industries, Inc. has leased a full line of memories from Ampex Corp. for use with two IBM 360/40s.

Standard Memories has installed a 265K byte Smart add-on core memory for a 360/40 at ITT-Cannon, Santa Ana, Calif.; a 144K byte unit for a 360/40 at BASF Wyandotte Corp.; and a 64K byte unit for a 360/40 at Ex-Cello Computer Products in Cherry Hill, N.J.

Scan-Data Corp. has received lease orders for its optical character recognition (OCR) systems from Pan-American Life Insurance Co., New Orleans; The Veterans Administration, St. Paul, Minn.; and Western Electric Co., Cockeysville, Md.

Macy's of Northern California has installed a Quantor 100N computer output microfilm information system and 23 displays for customer account identification and account status verification.

Computer Resources Ltd. has installed an Orbit 1 OCR document scanner at Reader's Digest, Montreal.

R. Dixon Speas Associates will use a Voicepac-2000 system for information on air cargo shipments and support of a computerized flight-planning service.

Orders & Installations

mation Center, the National Law Enforcement Teletype System, the Wisconsin Department of Justice, the Crime Information Bureau and the state Department of Transportation.

Under the \$600,000 order, EMR is also supplying its DCS-16 communications software system to control message traffic.

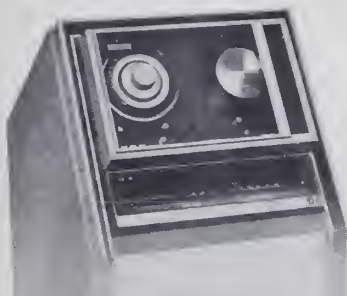
Other Orders, Installations

The Farm Bureau Insurance Co., Indianapolis, Ind., has installed 27 Bunker Ramo 2206/17 CRT terminals for policy inquiries.

Brokerage Transaction Services, Inc. will install a message-switching and order-matching system at Thomson & McKinnon Auchincloss, Inc., a Wall Street brokerage house.

The State Department has ordered 54 Series 200 CRT terminals from Computek, Inc., for use in a message entry and retrieval system.

The Ventura County Star-Free Press has installed a Tal-Star



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DEC Sets Records

3 Mini Makers Report Higher Earnings

Mini makers seem to be having a good year. Digital Equipment Corp. (DEC) reported record revenues and earnings in the nine months ended April 1, while Computer Automation Inc. also saw revenues and earnings rise in the same period. Interdata Inc.'s first-quarter revenues almost doubled, and the firm turned around its profit picture.

Nine-month revenues at DEC rose to \$131.1 million from \$104.3 million in the same period last year. Earnings reached \$10.2 million or \$1 a share, compared with \$7.7 million or 78 cents a share in the same 1971 period.

"This improved performance

reflects the strength of the mini-computer market and our position within that market," stated Kenneth H. Olsen, Digital president.

The core memory production and testing equipment purchased from RCA began operation during the third quarter, allowing DEC to reduce certain core memory component prices, according to the company. This gives DEC additional flexibility to meet customer cost/performance needs, the firm said.

Computer Automation reported nine-month revenues rose to \$2.9 million, up from \$1.6 million in the same 1971 period, while earnings jumped to

\$316,270 from \$5,559 in the period last year.

At Interdata, first-quarter revenues increased to \$2.8 million from \$1.4 million in the same period last year, and earnings totaled \$210,700, or 11 cents a share, compared with a \$218,500 loss in the same quarter last year.

Nickels & Dimes

General Automation reduced its R&D costs to 9.1% of sales during 1971, compared with 16.6% of sales in 1970.

\$\$\$

A sluggish third quarter order rate at Computer Test caused parent Computest to write-down inventories of \$497,000, or 52 cents per share, in nine months ended Feb. 29. This accounted for about 46% of the firm's \$1.1 million loss during the period.

\$\$\$

Despite a switch to the operating method of accounting, Computer Consoles revenues grew to \$1.6 million at the end of 1971 from a restated \$463,165 in 1970. Committed future lease revenues totaled \$2.9 million compared with about \$650,000 a year ago.

\$\$\$

Ampex has extended its credit position to June 30, 1972. "The lenders and the company wish to restructure the debt presently owing by the company to each lender, pending negotiations looking toward a new agreement between the company and all the lenders relating to such debts," stated President Arthur H. Hausman.

\$\$\$

The international semiconductor industry is resuming its growth after a 27-month halt, according to Mark S. Shepherd Jr., president of Texas Instruments.

DP Segments of CDC, Xerox Prove Drag on 1st Quarter Operations

Despite lagging contributions from the computer divisions, Xerox Corp. and Control Data Corp. (CDC) reported profitable first periods, although CDC's earnings declined.

At Xerox, computer orders during the quarter were higher than those in the same 1971 period, although losses continued. But corporate revenues rose 22%, to a record \$549.8 million from \$450.3 million in last year's comparable quarter. Earnings totaled \$57.4 million, or 73 cents a share, up 16% over \$49.6 million, or 63 cents a share in the first quarter ended March 31, 1971, also a new rec-

ord.

At CDC, earnings before a \$510,000 special credit dropped to \$10.5 million, or 70 cents a share, from \$11.9 million, or 80 cents a share last year.

Sales declined to \$127.7 million from \$141 million a year before. A loss of \$2.1 million was reported, largely from computer operations, compared with a profit of \$705,000 a year ago. But earnings of Commercial Credit Co., a CDC subsidiary, more than offset this loss, with income of \$13.7 million, up from \$12.3 million a year earlier.

Acquisitions

Peripherals General Inc. has agreed to acquire Peterman, Korn & Millard, a consulting firm specializing in the design and development of disk storage controllers.

Fabritek Inc. and Digiac Corp. have agreed in principle to the acquisition of Fabritek Education Systems Inc., a Fabritek subsidiary, by Digiac. Under the terms of the transaction, Fabritek will receive approximately one-third of the outstanding shares of Digiac.

Technology Service Corp. has acquired Computer-Based Systems, Inc., a Los Angeles firm which provides computerized management services for physicians.

Equimatics, Inc. has acquired United Systems International, Inc., a company specializing in software and services for the in-

surance industry.

System Development Corp. has agreed to purchase Mechanics Research, Inc. for cash and warrants. The transaction is subject to stockholder approval.

Systems, Science and Software, Inc. has acquired Information Research Associates, Inc. for an undisclosed amount of common stock.

New Registrations

ADVANCED DIGITAL SYSTEMS, INC., 146 W. Main St., Mohawk, N.Y., designer and manufacturer of magnetic tape library control systems, filed to register 150,000 shares of common. Proceeds, at \$8 per share maximum, to be used to finance leases and for working capital. The underwriter is J.D. Winer & Co., Inc., 5 Hanover Sq., New York, N.Y. 10004.

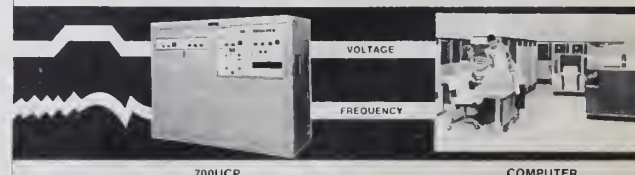
MEMOREX CORP., San Tomas at Central Expressway, Santa Clara, Calif., filed to register 16,000 shares of common, of which 15,000 may be issued to stock optionees and shareholders of Midwest Systems Corp., a majority-owned subsidiary, and 1,000 to shareholders of MRX Sales and Service Corp., also a majority-owned subsidiary.

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	1972 RANGE	CLOSE APR 27 1972	WEEK NET CHNGE	WEEK PCT CHNGE
E				
X				
C				
H				

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A	APPLIED DATA RES.	5- 7	5 1/2	+ 1/8	+2.3
O	APPLIED LOGIC	1- 4	1 3/4	- 1/4	-12.5
N	AUTOMATIC DATA PROC	72- 91	84 1/8	-2 1/8	-2.4
O	AUTO SCIENCES	1- 1	1 1/2	+ 1/4	+100.0
O	COMPUTER DIMENSIONS	0- 14	8 1/2	- 1/2	-5.5
O	COMPUTER NETWORK	4- 7	4 5/8	0	0.0

N	COMPUTER SCIENCES	8- 10	8 7/8	- 1/4	-2.7
O	COMPUTER TECHNOLOGY	6- 8	7 1/4	+ 3/4	+11.5
O	COMPUTER USAGE	9- 14	12 3/4	- 1/4	-1.9
O	COMP AUTOMOT REPORTS	7- 9	6	0	0.0
N	COMPUTING & SOFTWARE	22- 28	23 -1 7/8	-7.5	
O	COMRESS	1- 3	2 1/4	+ 1/8	+5.8
O	COMSHARE	5- 10	8 3/8	0	0.0

O	DATA AUTOMATION	1- 1	1/4	0	0.0
O	DATAMATION SERVICE	1- 1	5/8	0	0.0
O	DATATAB	5- 9	7	- 3/8	-5.0
O	EDP RESOURCES	4- 8	5 3/4	- 1/4	-4.1
A	ELECT COMP PROG	3- 5	3 1/8	- 3/8	-10.7
N	ELECTRONIC DATA SYS.	43- 63	56 5/8	-4 3/8	-7.1
O	INFORMATICS	8- 11	8 3/8	- 3/8	-4.2

O	I.O.A. DATA CORP	1- 2	2 1/8	- 1/8	-5.5
A	ITEL	9- 12	9 1/8	- 1/2	-5.1
O	KEANE ASSOCIATES	4- 7	6 + 1/2	+9.0	
O	KEYDATA CORP	7- 11	10 3/4	+1 7/8	+21.1
O	LOGICON	4- 9	7 5/8	0	0.0
A	MANAGEMENT DATA	6- 10	8 1/4	- 1/2	-5.7
O	NATIONAL CSS INC	8- 17	14 1/2	-2 1/4	-13.4

O	NAT COMP ANALYSTS	1- 1	7/8	0	0.0
P	ON LINE SYSTEMS INC	8- 15	12 1/4	- 1/2	-3.9
N	PLANNING RESEARCH	14- 17	15 1/8	- 3/8	-2.4
O	PROGRAMMING METHODS	22- 24	23 + 3/4	+3.3	
O	PROGRAMMING & SYS	1- 2	1 1/2	0	0.0
O	SCIENTIFIC COMPUTERS	3- 4	3	0	0.0
O	SIMPLICITY COMPUTER	1- 5	4 - 1/4	-5.8	

O	SOFTWARE SYSTEMS	1- 3	1 3/8	0	0.0
O	TBS COMPUTER CENTERS	4- 5	5 1/8	- 1/8	-2.3
O	TRACOR COMPUTING	2- 3	1 3/4	- 1/8	-6.6
O	TYN'SHARE INC	7- 10	7 5/8	+ 1/8	+1.6
O	UNITED DATA CENTER	5- 8	7 3/4	+ 1/4	+3.3
N	UNIVERSITY COMPUTING	19- 26	24 - 3/8	-1.5	
A	URS SYSTEMS	6- 9	9 + 3/8	+4.3	

O	VORTEX CORP	4- 5	2 1/2	0	0.0
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PERIPHERALS & SUBSYSTEMS

N	ADRESSOGRAPH-MULT	34- 42	37 1/2	+ 3/4	+2.0
O	ALPHANUMERIC	1- 2	5/8	0	0.0
N	AMPEX CORP	8- 15	8 1/8	- 3/8	-4.4
O	ANDERSON JACOBSON	5- 8	6 + 1/2	+9.0	
O	ATLANTIC TECHNOLOGY	3- 11	6 3/4	- 1/4	-3.5
A	BOLT, BERANEK & NEW	5- 18	14 7/8	-1 5/8	-9.8
N	BUNKER-RAMO	9- 14	12 7/8	- 3/8	-2.8

A	CALCOMP	19- 25	20 3/8	- 3/8	-1.8
O	CENTRONICS DATA COMP	11- 39	36 -3	-7.6	
O	COGNITRONICS	3- 5	2 3/4	0	0.0
O	COMPUTER COMMUN.	3- 7	3 7/8	- 3/8	-8.8
A	COMPUTER EQUIPMENT	3- 4	3 1/2	+ 1/8	+3.7
O	COMPUTER MACHINERY	7- 13	11 3/4	+ 3/4	+6.8
A	COMPUTEST	6- 9	6 + 1/8	+2.1	

O	CONSOL COMPUTER LTD.	1- 1	1/2	0	0.0
A	DATA PRODUCTS CORP	5- 7	5 3/4	- 1/2	-8.0
O	DATA RECOGNITION	4- 5	4	0	0.0
O	DATA TECHNOLOGY	3- 5	3 - 1/4	-7.6	
O	OI/AN CONTROLS	0- 8	6 3/4	+ 1/4	+3.8
O	OIGITRONICS	3- 4	3 3/8	0	0.0
N	ELECTRONIC M & M	6- 8	5 3/4	- 1/2	-8.0

O	FABRI-TEK	2- 5	4 1/2	- 3/8	-7.6
O	GENERAL COMPUTER SYS	7- 16	12 3/4	+ 1/4	+2.0
N	GENERAL ELECTRIC	59- 70	66 5/8	-1	-1.4
N	HAZELTINE CORP	9- 13	10 3/4	- 1/4	-2.2
O	INFOREX INC	28- 47	40 - 1/2	-1.2	
O	INFORMATION DISPLAYS	3- 5	3 - 1/8	-4.0	
O	MANAGEMENT ASSIST	1- 2	1	0	0.0

N	MEMOREX	27- 38	33 3/8	+ 3/4	+2.2
A	MILGO ELECTRONICS	17- 39	36 5/8	- 3/4	-2.0
N	MOHAWK DATA SCI	20- 27	25 3/4	-1 3/8	-5.0
O	OPTICAL SCANNING	7- 16	12 + 1 3/4	+17.0	
O	PERTEC CORP	12- 17	12 1/4	-1 1/4	-9.2
O	POTON	7- 15	13 1/4	-1	-7.0
A	POTTER INSTRUMENT	15- 21	16 7/8	- 1/2	-2.8

O	PRECISION INST.	7- 13	11 + 2 1/2	+29.4	
O	RECOGNITION EQUIP	10- 15	10 5/8	+ 1/2	+4.9
N	SANDERS ASSOCIATES	16- 21	16 3/4	- 7/8	-4.9
O	SCAN DATA	9- 13	11 3/4	+1 1/4	+11.9
O	STORAGE TECHNOLOGY	17- 27	21 1/2	-1 3/4	-7.5
O	SYCOR INC	7- 10	7 1/4	+ 1/4	+3.5
O	TALLY CORP.	8- 13	9 5/8	+ 3/8	+4.0

N	TEKTRONIX INC	34- 50	47 7/8	+ 3/8	+0.7
N	TELEX	10- 15	10 1/4	- 3/4	-6.8

SUPPLIES & ACCESSORIES

O	BALTIMORE BUS FORMS	6- 9	8 1/4	- 1/4	-2.9
A	BARRY WRIGHT	9- 13	10 7/8	- 5/8	-5.4
A	OATA DOCUMENTS	17- 26	25 1/8	0	0.0
O	OUPLUX PRODUCTS INC	12- 16	12 3/4	- 1/2	-3.7
N	ENNIS BUS. FORMS	7- 9	8 1/4	- 3/8	-4.3
O	GRAHAM MAGNETICS	15- 27	21 3/8	- 3/4	-3.3
O	GRAPHIC CONTROLS	12- 15	14 3/8	- 1/8	-0.8

N	3M COMPANY	129-149	140 5/8	-2 3/8	-1.6
O	MOORE BUS. FORMS	42- 48	47 - 3/8	-0.7	
N	NASHUA CORP	48- 56	50 1/2	-3 5/8	-6.6

	1972 RANGE	CLOSE APR 27 1972	WEEK NET CHNGE	WEEK PCT CHNGE
E				
X				
C				
H				

O	REYNOLDS & REYNOLD	37- 77	40 - 1/4	-0.6	
O	STANDARD REGISTER	16- 20	17 -1 1/8	-6.2	
O	TAB PRODUCTS CO	14- 17	16 3/4	0	0.0
N	UARCO	23- 28	24 3/8	- 1/8	-0.5

A	WABASH MAGNETICS	8- 11	9 7/8	- 5/8	-5.9
N	WALLACE BUS FORMS	23- 26	24 5/8	-1	-3.9

COMPUTER SYSTEMS

N	BURROUGHS CORP	147-175	168 1/4	- 3/8	-0.2
N	COLLINS RADIO	14- 20	17 3/8	-1 5/8	-8.5
N	CONTROL DATA CORP	43- 67	63 1/2	+ 1/2	+0.7
O	DATA GENERAL CORP	56- 99	89 +3	+3.4	
O	DIGITAL COMP CONTROL	13- 25	14 +1	+7.6	
N	DIGITAL EQUIPMENT	72- 97	82 1/2	+1 1/2	+1.8
N	ELECTRONIC ASSOC.	6- 13	11 1/2	- 3/8	-3.1
A	ELECTRONIC ENGINEER.	8- 14	10 3/8	+ 1/8	+1.2

N	FOXBORO	34- 41	37 1/2	- 5/8	-1.6
O	GENERAL AUTOMATION	13- 26	22 3/4	- 1/2	-2.1
N	HEWLETT-PACKARD CO	46- 60	56 5/8	-2 5/8	-4.4
N	HONEYWELL INC	130-158	145 3/4	-3 1/4	-2.1
N	IBM	333-398	381 -6 3/4	-1.7	
O	INTERDATA INC	8- 16	10 3/4	-3 3/8	-23.8
O	MICRODATA CORP	5- 10	8 1/2	-1	-10.5

N	NCR	29- 34	31 -1	-3.1	
N	RAYTHEON CO	39- 47	42 1/2	-2 1/2	-5.5
N	SPERRY RAND	30- 39	32 7/8	-2 1/8	-6.0
A	SYSTEMS ENG. LABS	11- 16	13 3/4	- 7/8	-5.9
N	VARIAN ASSOCIATES	14- 18	15 1/2	- 3/4	-4.6
N	VICTOR COMPTOMETER	15- 24	21 1/4	-1 1/4	-5.5
N	WANG LABS.	35- 59	53 3/4	- 3/8	-0.6

N	XEROX CORP	121-146	137 1/2	-1 1/2	-1.0
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LEASING COMPANIES

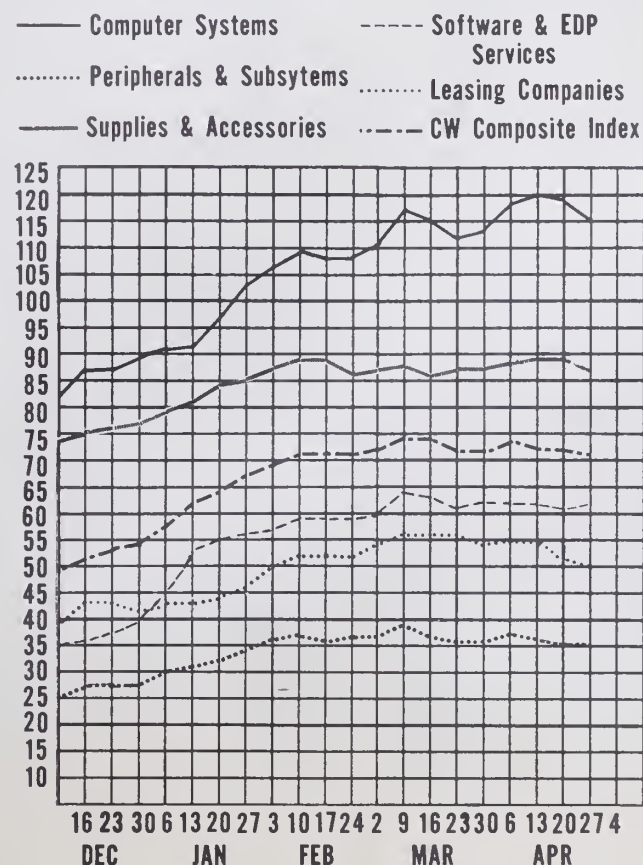
A	BOOTHE COMPUTER	9- 18	9 5/8	- 3/8	-3.7
O	BRESNAHAN COMP.	2- 3	2 3/8	- 1/8	-5.0
O	COMDISCO INC	6- 14	13 3/4	- 1/4	-1.7
O	COMPUTER EXCHANGE	2- 2	2 1/8	- 1/8	-5.5
A	COMPUTER INVSTRS GRP	8- 14	11 7/8	-1 1/8	-8.6
N	OPF INC	8- 13	7 5/8	- 7/8	-10.2
M	OATRONIC RENTAL	3- 4	3 1/4	+ 1/8	+4.0

A	OCL INC	8- 10	7 5/8	0	0.0
A	OEARBORN-STORM	18- 26	22 - 7/8	-3.8	
A	OPA, INC.	5- 8	6 3/4	+ 5/8	+10.2
A	GRANITE MGT	8- 11	9 1/8	- 1/2	-5.1
A	GREYHOUND COMPUTER	8- 11	8 3/8	- 3/8	-4.2
N	LEASCO CORP	20- 24	21 -1 1/4	-5.6	
O	ELECTRO MGT INC	2- 4	2 3/4	- 5/8	-18.5

O	NCC INDUSTRIES	8- 11	9 3/8	- 1/4	-2.5
A	ROCKWOOD COMPUTER	4- 7	4 5/8	- 1/8	-2.6
O	SYSTEMS CAPITAL	3- 14	14 3/8	+ 5/8	+4.5
N	U.S. LEASING	36- 48	45 1/2	- 3/4	-1.6

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
P=PHIL-BALT-WASH
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index



Earnings Reports

LOGIC
Year Ended Dec. 31

	1971	1970
Shr Ernd	a\$.18
Revenue	3,254,868	\$626,030
Spec Cred	b200,000
Earnings (Loss)	c423,134	(699,769)

a-Based on income before special credit. b-Tax loss carryforward. c-Equal to 34 cents a share.

EDP RESOURCES

Nine Months Ended Jan. 31

	1972	1971
Shr Ernd	\$.02
Revenue	\$10,860,181	9,793,135
aSpec Cred	31,030	115,975
bEarnings	28,281	131,732

a-Represents gain on purchase of the company's own 8-1/2% secured equipment notes and gain on sale of equipment. b-Equal to 4 cents a share in 1972 and 17 cents a share in 1971.

NATIONAL INFORMATION SYSTEMS

Year Ended Dec. 31

	1971	a1970
Shr Ernd	b\$.09	\$.01
Revenue	6,489,132	4,622,969
Spec Chg	d522,825
Earnings (Loss)	(162,974)	16,123

a-Restated to reflect the acquisition of Computer Investments & Leasing Corp. on a pooling-of-interests basis. b-Based on income before special charge. d-Primarily the writeoff of goodwill resulting from the purchase of Mastech Computer Systems Inc. in 1970.

TRACOR

Year Ended Dec. 31

	1971	a1970
Shr Ernd	b\$.38
Revenue	70,894,000	\$66,692
Loss Disc	Op	343,000
Spec Chg	d17,475,000
Earnings (Loss)	(16,497,000)	81,000
b3 Mo Shr	.13	.09
Revenue	18,267,000	16,519,000
Loss Disc	Op
Spec Cred	e25,000	142,000
Earnings	342,000	223,000

a-Restated. b-Based on income before special items. d-Anticipated loss on discontinuance and divestiture of computer product activities and investments. e-From sale of subsidiary.

PROGRAMMED PROPRIETARY SYSTEMS

Three Months Ended Feb. 28

	1972	1971
aShr Ernd	\$2.3	\$0.6
bRevenue	784,175	538,568
Loss Disc		
Op	4,287	10,815
cSpec Cred	25,872	225,440
eEarnings	389,952	312,374
b9 Mo Rev	1,036,036	883,531
Loss Disc		
Op	16,622	39,737
cSpec Cred	25,872	225,440
Earnings		
(Loss)	e28,386	(31,998)

We made our fast one cheaper. And our cheaper one faster.

The 620/f-100:

Varian's 620/f was already beating the bigger, more expensive computers at their own game. The 620/f-100 is now doing it for even less. Less than \$28,000 in a full 32,768 word configuration. And that includes Memory Protection, Extended Arithmetic Package, Real Time Clock, and Power Failure/Restart.

Combined with VORTEX, the 750 nanosecond 620/f has carved a niche in the big boy's stronghold. To the point where we're meeting 1800's, 1700's, and Sigma 3's toe to toe. And winning.

To put it bluntly, the 620/f with VORTEX goes to work faster and for less money. A simple equation of more computer capability for less investment.

The 620/L-100:

We've made our 1.8 μ sec 620/L a 950 nanosecond minicomputer. Twice the speed. In minimum configuration the 620/L-100 costs but \$6400. And that's complete with Hardware Mul-

tiply/Divide, Real Time Clock, Power Failure/Restart, and 8 Priority Interrupts. DEC's PDP 11-20 will cost a great deal more. Even the 11-15 costs more.

The NOVA 800 fares little better. Our 620/L-100 has better instructions, addressing modes, interrupts, and software.

And the new 620/L-100 has complete software compatibility with the outstanding package already available to the 620/L.

More computer power for less money. Call or write for full details. Varian Data Machines, 2722 Michelson Drive, Irvine, California 92664. (714) 833-2400.

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